American Journal of Public Health
and THE NATION'S HEALTH

Volume XXIII September, 1933 Number 9

The Sanitary Control over the Production and Handling of Shellfish on the Pacific Coast*

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WITH the appearance of numerous and widespread cases of typhoid fever in the eastern part of the United States in the latter part of 1924 and in the early part of 1925, studies were made by health authorities to determine the sources of the infection. After considerable study the investigators concluded that oysters were responsible. To protect the public health and to restore public confidence in the shellfish industry, a committee, known as the Committee on the Sanitary Control of the Shellfish Industry in the United States, was formed on February 19, 1925, to study the problem. Representatives of the shellfish industry as well as federal, state and municipal health officials were included in the personnel. A report by this committee was made to the Surgeon General of the U. S. Public Health Service in 1925, in which were recommended minimum requirements for control of the shellfish industry. Two supplementary reports have since been issued. Speaking generally, it is these minimum requirements which are followed by the U. S. Public Health Service and the various state agencies engaged in the sanitary control of shellfish.

On the Pacific Coast Washington led the way in June, 1927, when the State Board of Health adopted rules and regulations for the sanitary control of shellfish. Oregon and California followed in January, 1932, and Washington amended its regulations in January, 1933. The requirements of the three Pacific Coast states are practically identical and in general conform with the minimum requirements of the U. S. Public Health Service.

Though the term shellfish as used in various state regulations includes all varieties of clams, mussels and scallops as well as oysters, this paper will be limited to a discussion of the sanitary control of oysters. From a public health point of view oysters are the most important of the shellfish group for the following reasons:

* Read before the Session on Sanitation, Water, Food and Milk of the Fourth Annual Meeting of the Western Branch of the American Public Health Association, Pasadena, Calif., May 30, 1933.

1. The location of oyster beds and the feeding habits of oysters make them generally more subject to pollution than other shellfish.
2. Methods of production, handling and distribution are such as to increase the likelihood of contamination.
3. Large numbers of oysters are eaten raw, whereas most other shellfish are thoroughly cooked before being eaten.

On the Pacific Coast three species of oysters are found: (1) Ostrea lurida, or Olympia, which is native to the Pacific Coast; (2) Ostrea virginica, or eastern, which has been transplanted from the Atlantic and Gulf states; and (3) Ostrea gigas, or Japanese, which has been imported from Japan and is known in the west as the Pacific oyster.

Oysters are an excellent food. They contain proteins, fats, carbohydrates, vitamins A, B, and C and many mineral constituents. Because of their high iron and copper content, they are especially valuable in the treatment and prevention of anemia. No other commonly used food except liver surpasses oysters in the amounts of iron and copper furnished in average servings. Other valuable elements are manganese, calcium and iodine. During the feeding season oysters store up large quantities of glycogen. Glycogen and the other constituents of oysters are easily digested even when eaten raw; consequently, they are an ideal food. It is unfortunate that such a valuable food should be open so easily to contamination either in the growing area or later as it is being handled and distributed. It is the duty of health officials to protect the public by requiring that all oysters be produced, processed, packed and distributed in accordance with approved sanitary methods. The safeguards in the oyster industry should be similar to and as effective as those placed around the production and handling of raw milk.

The state of Washington is by far the largest producer of oysters on the Pacific Coast. This is due to the fact that there are many extensive areas in the state which are suitable for oyster culture. Suitable bays and inlets in Oregon and California have been developed, but the intensive cultural methods of the Washington growers have not yet been largely adopted by the other states. British Columbia produces Olympia oysters, particularly in Ladysmith Harbor and Boundary Bay, some of which are shipped into the United States.

The phenomenal growth of the Pacific Coast oyster industry during the past three years can be accounted for by the importation of seed oysters from Japan. The most extensive plantings have been made in Puget Sound, Gray's Harbor, and Willapa Bay, all of which are in Washington. Growers in all three coast states have transplanted eastern oysters into the numerous bays available, but except in a few instances the eastern oyster has failed to progagate in western waters. At present most eastern oysters sold on the Pacific slope are secured direct from the Atlantic seaboard.

Japanese oysters have failed successfully to propagate in waters of the Pacific Coast, but because seed oysters may be purchased from Japan so cheaply very little effort has been made to secure heavy sets of "spat." It is probable that the water of the west coast is not sufficiently warm to cause complete development of oyster larvae. Under favorable conditions, heavy sets of native oysters can be secured.

It is evident that the production of Japanese oysters on the Pacific Coast is rapidly increasing. In most bays intensive fishing of the natural oyster beds long ago depleted the native species. Artificial methods of growing now widely practised have resulted in high yields per acre. In this cultural method the Puget Sound oyster growers have led.

Japanese, or Pacific, oysters were first planted on the Pacific Coast in the waters of Puget Sound in 1902, but extensive plantings were not begun until 1928 and 1929. In each succeeding year increasing numbers of cases of seed have been planted. The hardiness of the Pacific oyster, together with the rapidity with which it grows to a marketable size, has been largely responsible for the continued increase in importation. Instead of requiring from 3 to 5 years to attain marketable size, as required by the Olympia and eastern oysters, those imported require from 1½ to 3 years. This rapid growth can be accounted for by the fact that the Japanese oyster passes far greater volumes of water through its gills in a given length of time than the native or eastern species. Since oysters obtain their food by straining out from the water microscopic material such as diatoms, it follows that the more water pumped through the gills the more rapid the growth.

Oysters are more apt to become contaminated on growing areas than during opening and packing. It is of prime importance that all market shellfish be taken from clean areas. To determine whether or not a given area is safe, it is necessary to make a sanitary survey of the area and the surrounding country. Bacteriological examinations are made of the shellfish and of the water overlying the beds. The findings of sanitary surveys are essential in the interpretation of laboratory results and, conversely, laboratory analyses are often necessary to substantiate field data. Sanitary surveys are made to determine the extent of existing and potential sewage pollution both at the growing area and in the surrounding country.

In no case can direct fecal pollution of water near growing areas be tolerated. If sewage is discharged into the water at a distant point, consideration is given to the extent of sewage treatment, if any, before discharge, the amount of dilution available, the extent of natural purification which may take place, the temperature of the receiving body of water, and the time of flow to the

TABLE I

ANNUAL PRODUCTION OF SHELLFISH ON THE PACIFIC COAST*

	WASHINGTON		OREGON		CALIFORNIA		TOTAL	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
1928								
Eastern Oysters	73,640	$31,914	–	$ –	72,630	$30,699	146,270	$62,613
Olympia "	614,520	312,594	432	480	4,028	1,728	618,980	314,802
All clams and scallops	1,767,795	355,510	110,471	23,668	65,779	25,214	1,944,045	404,392
1929								
Eastern Oysters	8,780	5,698	–	–	43,725	21,862	52,505	27,560
Olympia "	608,964	356,443	9,000	6,000	9,295	4,647	627,259	367,090
Japanese "	65,796	23,326	–	–	–	–	65,796	23,326
All clams and scallops	1,318,424	240,683	56,600	9,651	55,107	24,869	1,430,131	275,203
1930								
Eastern Oysters	1,970	1,851	–	–	72,796	29,118	74,766	30,969
Olympia "	302,659	250,502	8,177	5,310	4,949	3,093	315,785	258,905
Japanese "	228,318	82,875	–	–	–	–	228,318	82,875
All clams and scallops	1,325,847	194,293	63,440	8,764	94,288	29,831	1,483,575	232,888
1931								
Eastern Oysters	1,990	1,870						
Olympia "	312,147	260,960						
Japanese "	1,373,767	498,000						
All clams	1,252,708	184,150						

* Data from reports of Washington State Dept. of Fisheries and U. S. Dept. of Commerce.

oyster beds. The likelihood of pollution from boats must also be given study.

In Oregon water samples for bacterial examination have been collected on both ebb and flood tides. The number has varied with the area under consideration—generally from 12 to 30 samples are taken on a single tide, the points of collection being approximately equidistant over the area studied. After a sanitary survey has been made of the surrounding country, one can usually tell whether to expect the best bacteriological results on the ebb or flood tide. Once this has become known, it has been the practice to limit sample collection to the tide which is apt to give the most pollution. In the early part of the work bottom water samples were often collected, but in most bays there was little difference between the *B. coli* scores of surface and bottom samples. Practically all samples are now collected from 6 inches to 12 inches below the surface.

Occasionally shellfish samples are dredged or tonged from the beds and sent to the laboratory for examination. Most investigators have found a wide variation in the *B. coli* scores of shellfish liquor. These discrepancies, together with the fact that the laboratory examination of shellfish is more laborious and time consuming than that of water, have led most states to rely mainly upon *B. coli* scores of the overlying water. Wide variations in shellfish liquor scores may be due to the fact that we are working with a living organism.

On the Pacific Coast, *B. coli* scores of shellfish liquor averaging about 2 and rarely exceeding 5 have been considered satisfactory. No allowable *B. coli* score, either of shellfish or of water overlying growing areas has been set by the western states. In some eastern states water scores not exceeding 2.3 to 3.6 are specified. Others recommend a maximum allowable score of 2.5, or not more than 50 per cent of the 1 c.c. portions positive for the coli-aerogenes group. In the west certainly the problem of sewage pollution is not so great as that in the oyster producing areas of the east, for the reason that the population on the Atlantic seaboard far exceeds that on our Pacific Coast.

The recommendations of the U. S. Public Health Service state that laboratory findings should be interpreted in view of the sanitary survey data. This should be done; nevertheless, there is need of a definite standard to be used throughout the country. At present each state seems to have its own standard, or frequently, no definite standard for approved areas.

In the bacteriological examination of shellfish liquor practically all the states follow the standard methods of the A.P.H.A. There is need for uniformity in the examination of water overlying shellfish areas. Routine procedure should include the examination of 5 portions each of 10 c.c., 1 c.c. and 0.1 c.c. of water, following the standard methods used in the bacterial analysis of water. A uniform standard for the quality of shellfish area water should be established, preferably by the U. S. Public Health Service. Standards for the certification of water supplies used on interstate carriers have been established, and there should be no legitimate objection to a reasonable standard for shellfish growing areas, the oysters from which are usually shipped interstate.

The regulations of the Pacific Coast states permit the transplanting of shellfish from unapproved areas to clean areas provided no shellfish are removed for market in less than thirty days. Transplanting must be approved by the state shellfish control authority and must take place when the oysters are feeding actively. Hibernating oysters do not cleanse themselves of pollution even when placed in clean water.

Whenever possible, toilet facilities at culling houses and living quarters are required to be located on land at a safe distance from the water. If it is not possible to provide for land disposal, chemical toilets are required.

TABLE II

CASES* OF JAPANESE SEED OYSTERS PLANTED IN OREGON AND WASHINGTON, 1930–1933

Year	*Number of Cases*
1930	12,430
1931	15,710
1932	36,600
1933	46,020

* Each case of seed contains from 12,000 to 16,000 young oysters.

It is difficult, if not impossible, to keep shucked oysters clean during the opening process unless the shell stock is reasonably free from mud. In many areas, particularly where oysters are grown on mud flats, growers have been required to install washing equipment. Pumps using sea water are in general use for washing shellfish at the live floats.

Shucking and packing plants are required to be similar in construction to modern milk plants. Those approved by the state health departments have floors and opening benches of concrete or other equally impervious material. Smooth surfaced, painted and easily cleaned walls and ceilings, as well as plenty of light and ventilation have been required in all modern plants. All equipment with which shucked oysters come in contact is of smooth, hard surface material, free from corrosion, and free from seams, cracks and grooves in which bacterial slime or food particles may collect. Approved plants also have adequate facilities for the cleaning and bactericidal treatment of all utensils, containers, etc., as well as an abundant supply of hot and cold water under pressure.

It is practically impossible to keep shucked oysters free from shell particles and other foreign matter during the opening process. It is, therefore, necessary to wash the shucked stock before it is packed for market. This can best be done with clean cold water. Various methods are used, but in most plants blowers or sprays have been found most effective. Whatever method is used, the washing process should be completed in three minutes or less. Shucked shellfish will "soak up" much fresh water if washed for long periods or allowed to stand in water. Some plants have found a 2 per cent to 3 per cent salt solution helpful in cleansing the oyster meats of adhering slime and particles of dirt.

Pacific oysters vary in size to such an extent that they must be graded at packing plants. Small oysters have a higher market value than large. Sorting or grading is done on monel metal tables which drain into the washing sink. Monel metal has been more successful for equipment and utensils than any other because it does not corrode and is easily kept clean and bright.

Refrigerators are used at all plants to cool shucked shellfish immediately after the washing and packing process. A temperature above freezing but below 50° F. is maintained in all cooling units. No ice or ice water is permitted to come in direct contact with shucked shellfish.

In an industry where there are so many dangers of transmitting the germs of infectious diseases to the product, rigid standards of cleanliness of employees must be enforced. Health examinations are given to all plant employees, and especial effort is made to detect carriers of typhoid, para-typhoid or other communicable diseases. No person who is suffering from, or is a carrier of, contagious disease or who has infected wounds on his arms or hands is permitted to work. All employees must wear clean garments. In addition,

shuckers must wear rubber or oil skin aprons and those washing or packing shellfish must wear rubber gloves. Washing facilities with hot and cold water, soap and individual towels, as well as sanitary toilet facilities, are a necessary part of all plants. All employees are required to wash their hands after each visit to the toilet and signs to this effect must be posted in conspicuous places.

Uniform requirements and constant supervision over shellfish growing areas and shucking plants on the Pacific Coast are necessary to protect the public health and, incidentally, to encourage and safeguard a rapidly developing industry.

International Congress on Working Mothers and Their Children

THE first international congress on working mothers and their children was held in Paris from June 7 to June 11, 1933, under the auspices of the Union Feminine Civique et Socials. The purpose of the congress was to call the world's attention to the evils of the employment of mothers outside the home and to discuss its causes and remedies. The congress was attended by delegates from more than 20 countries, among them the United States.

Reports were read on the condition of wage earning women in various countries. It was pointed out that in France 35 to 40 per cent of all married women were employed outside their homes, and in this way 700,000 homes were deprived of their mothers during work hours; in Germany the number was almost the same; in Brazil, of 150,000 women factory workers 50,000 were married and had children; in Poland the number of working women was larger than that of working men; in Austria the number of married working women had constantly increased. It has been found that a married woman's work outside the home necessitates expenses which amount on the average to 50 per cent of her earnings. The delegates spoke against day nurseries for infants, day centers for older children, and other unsatisfactory but costly measures that should be replaced by allowances to mothers, coöperative societies, and mutual aid funds, and by other arrangements. All speakers urged legislative measures for safeguarding the family.

The resolutions passed asked among other things for the payment of a wage sufficient to meet the normal needs of a family with the mother staying at home. In the meantime the conditions of women in employment should be made as satisfactory as possible. Society must increase the number of agencies, particularly mutual aid agencies, aiming to aid the home and to give a certain amount of security to the family. It was stated that international, as well as national, legislation is needed for this purpose.

Finally, the congress urged the establishment in all countries of committees, such as are already in existence in some countries, for the carrying out of the resolutions.—*Journal des Débats,* June 5–15, 1933; *Le Temps,* June 7–12, 1933; and *Le Matin,* June 5–13, 1933.

Resident Mortality from Tuberculosis in Urban and Rural New York According to Age, Sex, Color, and General Nativity*

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OFFICIAL vital statistics do not always measure accurately the natality and mortality of communities, mainly because of the general practice of registering births and deaths in the place of their occurrence, which often is not the permanent residence of the mother or of the decedent. In 1926, therefore, the Division of Vital Statistics of the New York State Department of Health undertook the task of measuring in a logical and consistent manner the natality and mortality among the *residents* of the more important administrative units of the State. Birth rates and death rates corrected for change of residence are now published in the annual reports of the Division. Special attention has been given to the determination of resident mortality from tuberculosis because the segregation of many sufferers from this disease in hospitals and sanatoria distorts, often to a degree of uselessness, the recorded rates of mortality in many urban and rural areas.† Table I illustrates the weight of residence in areas even as large as the city of New York and the entire urban and rural sections of the rest of the State:

The purpose of this paper is to analyze the resident tuberculosis mortality in the State and its main subdivisions according to sex, age, color, and nativity. The period chosen is the triennium 1929–1931. The fact that the latest census data are for the mid-year 1930 makes, of course, for the greater accuracy of the computed rates.

The number of deaths from all forms of tuberculosis of residents of New York City which occurred anywhere in the State in the course of the three-year period was 16,703; the corresponding number of deaths for the rest of the State was 10,134, of which 6,943 were of residents of the urban territory, 3,191 of rural New York. The rates per 100,000 population according to sex and age were as shown in Table II.

The curves of mortality for males begin with a peak in the youngest age

* Read before the Vital Statistics Section of the American Public Health Association at the Sixty-first Annual Meeting in Washington, D. C., October 24, 1932.

† *See:* J. V. DePorte, Recorded and Resident Death Rates from Tuberculosis in New York State in 1926, *Am. Rev. Tuberc.*, XVII:634–662, June, 1928. (This paper also contains a detailed description of the method employed in the allocation of deaths according to residence.)

J. V. DePorte, Some Aspects of the Recorded and Resident Mortality from Tuberculosis in New York State in 1927 and 1928, *Am. Rev. Tuberc.*, XXII:87–115, July, 1930.

Jessamine S. Whitney, Study of Urban and Rural Tuberculosis Death Rates in New York State. *A. J. P. H.*, XVIII:978–984, Aug., 1928.

Edgar Sydenstricker, The Trend of Tuberculosis Mortality in Rural and Urban Areas, *Am. Rev. Tuberc.*, XIX:461–482, May, 1929.

TABLE I

RECORDED AND RESIDENT DEATH RATES, PER 100,000 POPULATION, FROM ALL FORMS OF TUBERCULOSIS

Year	*Recorded*			*Resident*		
	New York City	*Rest of State*		*New York City*	*Rest of State*	
		Urban *	*Rural* *		*Urban* *	*Rural* *
1926	85.4	70.6	88.4	94.2	83.3	60.0
1927	78.1	64.3	81.7	85.9	75.2	57.4
1928	79.4	63.6	82.1	88.0	73.9	56.2
1929	75.5	58.8	80.6	83.3	71.1	54.1
1930	73.1	51.5	78.6	80.3	63.3	53.4
1931	69.4	48.1	72.7	76.5	61.1	44.6

* *Urban* includes cities and other incorporated places whose population was 2,500 or more. *Rural* includes the remainder of the Upstate area.

group, under 5 years, coming down to a minimum in the age group 10–14 years and rising to a maximum at 55–64 years in New York City with the next highest rate at 45–54 years; in the urban part of the rest of the State the maximum rate was that at 45–54, the rate at 55–64, however, being of practically the same magnitude. In rural New York the peak was in the oldest

TABLE II

RESIDENT DEATH RATES, PER 100,000 POPULATION, FROM ALL FORMS OF TUBERCULOSIS BY SEX AND AGE: NEW YORK CITY AND URBAN AND RURAL AREAS OF REST OF STATE, 1929–1931

Age	Males			Females		
	New York City	Rest of State		New York City	Rest of State	
		Urban	Rural		Urban	Rural
Total	97.6	76.2	55.5	62.2	53.7	46.2
Under 5 Years	49.0	31.0	20.5	41.2	27.9	17.8
5–9 years	10.6	10.8	5.6	8.0	9.5	4.5
10–14 years	9.7	11.3	6.7	15.2	13.4	9.7
15–19 years	45.1	36.2	24.1	76.9	65.1	43.9
20–24 years	87.8	67.0	42.9	107.9	91.5	96.6
25–29 years	101.2	80.8	70.1	93.5	89.8	82.8
30–34 years	107.2	94.0	87.4	80.2	74.0	77.0
35–44 years	132.9	107.6	90.6	57.2	56.7	51.8
45–54 years	170.9	131.6	77.6	56.8	48.5	41.6
55–64 years	198.6	131.4	75.8	65.4	54.8	47.1
65–74 years	163.6	114.8	81.5	67.7	61.3	61.5
75 years and over	115.5	75.7	92.5	70.0	53.6	68.9

age group, 75 years and over, with an almost equally high rate at 35–44 years. Among females, we also find a peak in the youngest age group, under 5 years, with the minimum in the next group, 5–9 years; the maximum rates, however, were in much younger age groups than among males, the mortality in all three sections of the State being relatively highest among young women 20–24 years.

The total death rate in New York City exceeded the corresponding rate in the rest of the urban territory of the State by 28 per cent among males and 16 per cent among females. Specific death rates by age were, with the exception of the age groups 5–9 years and 10–14 years, higher in New York City, the excess ranging from 14 per cent in the group 30–34 to 58 per cent among children under 5 years. Since the last group is numerically small, it is important to note the excess in New York City mortality in the large group 55–64 years where it equalled 51 per cent. Among children 5–9 years of age the rates were virtually equal, while in the next group, 10–14 years, the New York City rate was 14 per cent lower.

The death rates among females were higher in New York City at all ages, with the exception of 5–9 years. The excess of the New York City mortality, however, was not so great as among males, ranging from 1 per cent between 35 and 45 years to 48 per cent in the numerically small group under 5 years. Among children between 5 and 10 years, the New York City mortality was 16 per cent below the upstate urban rate.

Similarly, the urban upstate rate exceeded the rural rate at almost all ages, the exceptions being the groups 75 years and over among both sexes and 20–24, 30–34, and 65–74 years among females. The excess of the urban mortality upstate among males ranged from 8 per cent in the group 30–34 years to 93 per cent among children 5–9 years; next in size was the disparity in the age group 55–64 years—73 per cent.

GRAPH I

Resident Death Rates per 100,000 Population from All Forms of Tuberculosis by Sex and Age, in New York City and Urban and Rural Areas of Rest of State, 1929–1931.

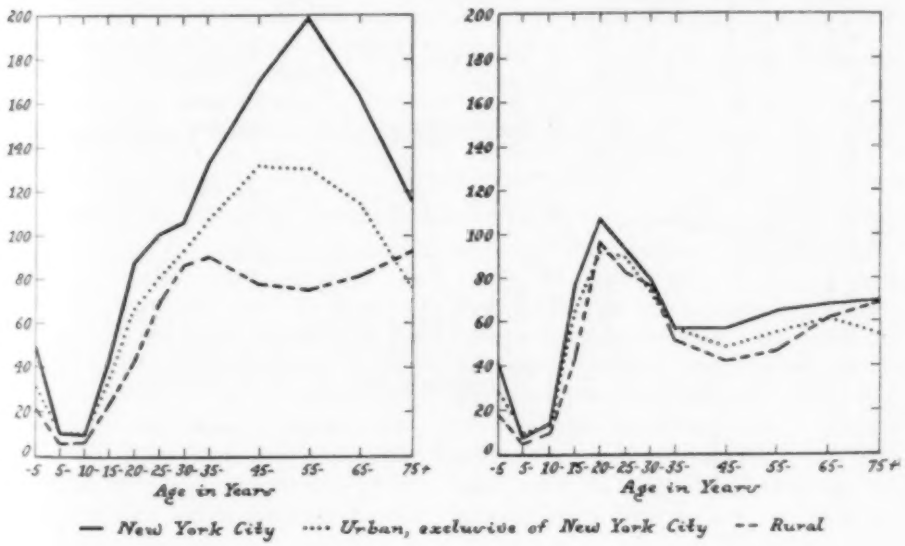


TABLE III

RESIDENT DEATHS AND DEATH RATES FROM ALL FORMS OF TUBERCULOSIS BY SEX, AGE, COLOR AND GENERAL NATIVITY: NEW YORK STATE, EXCLUSIVE OF NEW YORK CITY, 1929–1931

Age	Deaths									Rates per 100,000 Population					
	Total	White						Colored		Total	White				Negro
		Total	Native-born			Foreign-born	Country of birth not stated *	Negro	Other colored		Total	Native-born		Foreign-born	
			Native parentage	Foreign or mixed parentage	Parentage not stated *							Native parentage	Foreign or mixed parentage		
MALES															
All Ages	5,822	5,438	1,891	1,807	231	1,479	30	361	23	68.3	64.9	42.4	72.5	104.1	283.0
Under 5 years	186	163	113	42	4	4	–	22	1	26.9	24.0	24.5	19.7	92.4	210.0
5–9 years	68	60	29	28	3	–	–	8	–	8.8	7.9	6.1	10.4	–	77.7
10–14 years	73	66	32	28	1	5	–	7	–	9.5	8.7	7.4	9.2	27.6	80.5
15–19 years	224	198	86	94	3	15	–	24	2	31.6	28.3	22.3	33.5	45.7	283.3
20–24 years	394	342	149	143	6	43	1	50	2	58.7	52.0	40.8	63.6	63.9	382.3
25–29 years	492	448	184	174	9	80	1	41	3	77.3	72.4	54.6	99.1	75.0	262.1
30–34 years	591	537	214	176	19	128	–	52	2	91.8	85.5	66.1	103.9	94.9	356.9
35–44 years	1,334	1,255	393	370	46	436	10	73	6	101.6	97.5	65.0	123.5	114.0	320.7
45–54 years	1,140	1,093	314	343	48	375	13	45	2	111.0	108.1	67.1	146.9	121.3	325.2
55–64 years	762	734	208	251	45	227	3	26	2	107.7	104.8	64.7	134.6	117.8	434.6
65–74 years	424	413	125	125	32	129	2	9	2	102.2	100.3	64.6	117.2	115.6	370.8
75 years and over	134	129	44	33	15	37	–	4	1	84.6	82.1	50.7	118.2	87.1	389.9
FEMALES															
All Ages	4,312	3,985	1,699	1,413	133	731	9	302	25	51.0	47.9	38.2	54.4	57.4	236.4
Under 5 years	161	136	83	48	4	1	–	22	3	24.0	20.7	18.6	23.1	24.4	198.0
5–9 years	57	49	32	16	–	1	–	8	–	7.6	6.7	7.0	6.1	6.3	75.8
10–14 years	89	74	31	40	1	2	–	15	–	12.0	10.1	7.4	13.5	11.5	163.2
15–19 years	409	375	156	182	3	32	2	31	3	57.8	53.9	41.2	64.9	88.3	292.9
20–24 years	636	588	277	237	15	59	–	42	6	93.1	88.1	74.7	106.3	80.3	282.5
25–29 years	564	514	223	200	13	77	1	47	3	87.6	81.9	65.5	108.9	74.4	301.3
30–34 years	488	443	191	150	14	88	–	41	4	75.0	69.6	57.8	83.1	69.9	314.0
35–44 years	693	630	257	194	15	163	1	60	3	55.0	50.9	42.6	59.8	52.4	289.9
45–54 years	457	436	172	126	22	115	1	19	2	46.1	44.5	37.1	48.5	45.1	152.6
55–64 years	370	364	116	113	19	114	2	6	–	51.9	51.5	36.2	53.7	64.8	106.6
65–74 years	269	260	103	80	15	60	2	8	1	61.3	59.7	50.2	64.0	56.9	319.7
75 years and over	119	116	58	27	12	19	–	3	–	60.5	59.3	53.0	73.6	38.5	246.9

* The numbers in these columns were not considered in the computation of the rates. It is clear, however, that their distribution upon any basis would not change the relationship between the rates of the several nativity groups.

Among females, the excess of urban mortality was greatest under 20 years, the disparity being as high as 111 per cent at 5–9 years. After age 20 the maximum difference was only 17 per cent, in the age group 45–54.

The striking fact that the major portion of the excess mortality in New York City and in the urban part of the rest of State as compared with rural New York was among males between the ages of 45 and 65 is clearly seen in Graph 1.

Another interesting form of comparison is that of the male and the female mortality. The total death rate among males exceeded the rate among females by 57 per cent in New York City, 42 per cent in the urban part of the rest of State, and 20 per cent in rural New York. The most significant fact is the excess of female mortality in the three sections of the State between 10 and 25 years of age. In addition, upstate, the mortality among females was higher than among males also in the age group 25–29 years. At all of the other ages in New York City the death rate among males was higher, the disparity being greatest, over 200 per cent, between 45 and 65 years. In the urban part of the rest of the State and in rural New York the mortality among males was relatively highest at 45–54, exceeding the female mortality by 171 and 87 per cent, respectively.

The analysis of resident tuberculosis mortality by color and general nativity had to be limited to the upstate area only, the necessary data for New York City not being available. Table III shows the specific death rates in the State, exclusive of New York City, according to sex, age, color, and the general nativity of the white population.

The death rate among negro males, 283.0, was more than four times the corresponding rate among whites, 64.9; the rate among negro females, 236.4, was almost five times that among whites, 47.9. Without exception, the specific death rates by age were much higher than among whites. While the numbers upon which the negro rates are based are relatively small, deaths of negro males numbering 361 and females, 302, as compared with 5,438 and 3,985 for whites, the differences between the rates are of such magnitude that they are undoubtedly significant.

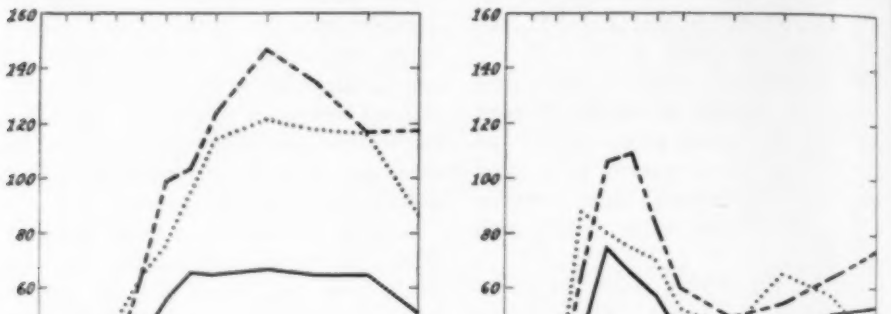
Among the three general nativity groups of the white population, the total death rate was lowest for the native-born of native parentage followed by the first native-born generation, the rate for the foreign-born being highest. When, however, we consider the mortality by age, we find that practically all the specific rates were higher among the first native-born generation than among the foreign-born. The differences between the rates for native-born persons of native parentage and those for persons of foreign birth or of immediate foreign origin were especially marked among adult males (see Graph 2). When the rates for the three groups are corrected for differences in the age distribution (by adjusting them to the population of the state, exclusive of New York City, according to age and sex), they are found to be as follows:

	Males	*Females*
Native-born of native parentage	45.0	39.3
Native-born of foreign or mixed parentage	82.3	56.5
Foreign-born	80.9	50.9

When the analysis is extended to the leading racial strains it is advisable to group the entire area of eastern and central Europe into a single unit because, in many instances, the information given on death certificates regarding country of birth does not correspond to the post-war boundaries. In no other way could one explain a tuberculosis rate of 279.8 for natives of Austria when the natives of Czecho-

GRAPH II

Resident Death Rates per 100,000 Population from All Forms of Tuberculosis by Sex, Age, and General Nativity of White Persons, in New York State, exclusive of New York City, 1929–1931.



slovakia show a rate of only 47.9; or a rate for natives of Hungary of 133.4, while the natives of Yugoslavia show a rate of less than half, 59.7. Although there were also modifications in the territories of Denmark and Italy, they were not sufficiently large to influence the validity of the rates.

The necessary population data not being available, it is impossible to make correction for differences in the age distribution of the foreign-born and the first native-born generation. No deductions, therefore, may be drawn from the comparative size of the total rates. It is interesting to note, however, that notwithstanding the undoubtedly more favorable age composition of the first native-born generation, the total death rate for persons of Irish parentage was higher than the corresponding rate for the natives of Ireland. Among the foreign-born, the Irish had the highest rate followed by natives of eastern and central Europe, while the Canadians and Italians showed the lowest rates. In the group of native-born of foreign or mixed parentage, persons of Irish stock had the maximum

TABLE IV

RESIDENT DEATH RATES, PER 100,000 POPULATION FROM ALL FORMS OF TUBERCULOSIS: NEW YORK STATE, EXCLUSIVE OF NEW YORK CITY, 1929–1931

Country of Birth or Origin	*Foreign-born*	*Native-born of Foreign or Mixed Parentage* *
Total	82.0	63.3
Canada	57.0	55.3
England, Scotland, Wales	62.0	58.5
Ireland	108.8	114.0
Norway, Sweden, Denmark	82.8	64.1
Italy	57.5	36.6
Eastern and central Europe †	100.2	59.3
Other foreign countries	106.0	54.7

* By country of birth of father, or if father was native-born or of unknown nativity, by country of birth of mother.

† Austria, Czechoslovakia, Germany, Hungary, Lithuania, Poland, Roumania, Russia, Yugoslavia.

rate and the Italian group the minimum.

Table V shows the death rates by age, sex, color, and general nativity in the urban and rural areas. The death rate of negro males was 345.3 in the urban area as compared with 117.6 in the rural area, and of negro females 280.1 in the urban area as compared with 106.0 in the rural. The total urban rate for males was 37 per cent higher than the corresponding rural rate and for females 11 per cent higher; if the death rates of whites only are considered, these differences are cut to 31 and 10 per cent, respectively.

The relationship mentioned earlier between the age and sex specific death rates for the three general nativity groups in upstate New York is found to exist when the urban and rural parts of the State are considered separately. Among males, the urban rates were higher than the rural except at 25–34 years for the two classes of native-born and at 35–44 years and the numerically unimportant group "under 15 years" for the foreign-born. The disparity between the rates was greatest between 45 and 65 years: 42.5 per cent for the native-born of native parentage, 73.3 per cent for the first native-born generation, and 56.0 per cent for the foreign-born. Among females, the differences in the urban and rural rates were negligible, the rural rates slightly exceeding those in the urban area between 25 and 45 years for the native-born of native parentage, between 15 and 45 and after 65 years for the first native-born generation, and between 25 and 45 for the foreign-born.

If the distribution of the rural population according to age, sex, color, and general nativity were the same as in the urban upstate area the total rural rate would be increased from 51.0 to 55.3. This corrected rate is still 15 per cent lower than the urban rate, 64.8.

General Summary—In 1929–1931, the excess of the resident tuberculosis mortality in New York City and in the urban part of the rest of the State, as compared with that of rural New York, was almost wholly due to the higher death rates among adult males, particularly between the ages of 45 and 65 years.

The death rates among males exceeded the rates among females at practically all ages with the important exception of the age groups 10 to 25 years in New York City and 10 to 30 years in the rest of State, where the mortality among females was ***higher*** than among males. The excess of male mortality was greatest in New York City, amounting to as much as 200 per cent between the ages of 45 and 65. In the urban and rural parts of the rest of State the difference was greatest in the age group 45 to 54 years—171 per cent in the urban and 87 per cent in the rural area.

The death rate among negroes greatly exceeded that among whites. The difference was especially marked in the urban area, where the negro male rate was 4.8 times and the female rate 5.2 times the white rate. In the rural area the negro rates for both males and females were slightly more than twice the corresponding rates among whites.

In the three general nativity groups of the white population, the total death rate was lowest among the native-born of native parentage, followed by the native-born of foreign or mixed parentage—the rate among the foreign-born being highest. When age specific death rates are considered, however, the rates at practically all ages are found to be ***higher*** among the first native-born generation as compared with the foreign-born. The differences were greater among males than among females and greatest among males between the ages of 45 and 65 years.

Among persons of foreign birth or immediate foreign origin, the crude death rates were highest among the

TABLE V

RESIDENT DEATHS AND DEATH RATES FROM ALL FORMS OF TUBERCULOSIS BY SEX, AGE, COLOR AND GENERAL NATIVITY: URBAN AND RURAL AREAS OF NEW YORK STATE, EXCLUSIVE OF NEW YORK CITY, 1929–1931

Age	Deaths									Rates per 100,000 Population					
	Total	White					Colored			Total	White				Negro
		Total	Native-born			Foreign-born	Country of birth not stated*	Negro	Other colored		Total	Native-born		Foreign-born	
			Native parentage	Foreign or mixed parentage	Parentage not stated*							Native parentage	Foreign or mixed parentage		
URBAN															
Males–All ages	4,024	3,694	1,099	1,332	126	1,117	20	320	10	76.2	71.3	45.7	76.2	108.8	345.3
Under 15 years	235	198	109	78	6	5	–	36	1	17.2	14.8	14.7	13.7	17.8	173.0
15–24 years	453	384	143	190	6	44	1	67	2	51.6	44.5	34.3	51.3	58.4	443.8
25–34 years	743	655	228	250	17	159	1	86	2	87.4	79.5	58.5	99.5	86.6	371.0
35–44 years	919	852	233	265	27	322	5	65	2	107.6	102.0	67.6	127.2	113.8	379.5
45–64 years	1,370	1,304	310	451	55	476	12	63	3	131.5	127.1	77.5	166.4	134.0	440.8
65 years and over	304	301	76	98	15	111	1	3	–	104.8	104.6	67.6	130.3	110.8	149.9
Females–All ages	2,919	2,648	1,001	1,023	78	538	8	268	3	53.7	49.6	39.8	54.2	57.6	280.1
Under 15 years	221	180	88	86	3	3	–	40	1	16.5	13.7	12.2	15.3	10.9	180.5
15–24 years	737	672	274	309	12	76	1	65	–	78.1	73.1	61.0	80.3	89.3	400.5
25–34 years	722	640	245	259	18	117	1	80	2	116.0	74.6	59.6	94.9	67.3	357.6
35–44 years	472	418	150	140	8	119	1	54	–	56.7	51.2	42.2	59.8	52.4	339.7
45–64 years	551	530	165	171	24	167	3	21	–	51.1	49.8	38.8	52.1	53.7	157.8
65 years and over	216	208	79	58	13	56	2	8	–	59.0	57.2	52.9	54.9	51.5	318.2
RURAL															
Males–All ages	1,798	1,744	792	475	105	362	10	41	13	55.5	54.6	38.6	63.7	91.9	117.6
Under 15 years	9[illegible]	91	65	20	2	4	–	1	–	10.6	10.6	10.3	9.2	37.2	11.5
15–24 years	165	156	92	47	3	14	–	7	2	32.9	31.6	27.5	34.8	56.3	108.4
25–34 years	340	330	170	100	11	49	–	7	3	78.9	78.1	62.0	106.7	84.7	99.5
35–44 years	415	403	160	105	19	114	5	8	4	90.6	89.3	61.5	115.0	114.6	142.1
45–64 years	532	523	212	143	38	126	4	8	1	76.8	76.3	54.4	96.0	85.9	144.7
65 years and over	254	241	93	60	32	55	1	10	3	89.7	85.7	55.4	101.1	102.0	688.7
Females–All ages	1,393	1,337	698	390	55	193	1	34	22	48.2	44.9	36.2	55.2	56.7	106.0
Under 15 years	86	79	58	18	2	1	–	5	2	10.4	9.7	9.7	8.7	10.2	57.5
15–24 years	308	291	159	110	6	15	1	8	9	68.3	65.7	53.0	92.7	61.0	128.6
25–34 years	330	317	169	91	9	48	–	8	5	79.9	78.1	65.2	99.8	86.4	127.4
35–44 years	221	212	107	54	7	44	–	6	3	51.8	50.3	43.3	59.9	52.5	125.0
45–64 years	276	270	123	68	17	62	–	4	2	44.0	43.4	34.3	47.7	41.3	83.8
65 years and over	172	168	82	49	14	23	–	3	1	63.9	62.8	49.6	87.4	50.0	249.4

* See footnote to Table III.

Irish and lowest among the Italians. In spite of the more favorable age distribution of the population, the death rate of native-born persons of Irish parentage was higher than that of natives of Ireland.

When correction is made for differences in the distribution of the population by age, sex, color, and general nativity, the total rural resident rate is found to be 15 per cent below the urban rate.

CONCLUSION

The causative factors in the higher urban mortality from tuberculosis are very likely environmental, since the excess over rural mortality remains when correction is made for the unlike sex, age, color, and nativity composition of the population. In view of the fact that the disparity is greatest among males between the ages of 45 and 65, it seems reasonable to assume that occupation is an element of prime importance.

Relative Merits of Raw and Pasteurized Milks

. . . There are, therefore, strong grounds for the belief that infants can satisfy all their requirements on diets of adequate amounts of pasteurized milk provided that extra vitamin D, and, of course, vitamin C, are added to the diet.

The subject is, however, one which demands further investigation. No body of evidence is available on which a really conclusive statement of the relative merits of raw and pasteurized milk, when fed without vitamin supplements, can be founded. This is surprising in view of the facilities afforded by child clinics for a really informative study of the question. Moreover, our whole knowledge of the metabolism of infants is singularly meager, and it is highly desirable that further work should be done in this field. More especially is it desirable, in view of the importance of calcium and phosphorus in the building up of the skeleton, that the requirements of children for these elements at various stages in the life-history should be more firmly established. Investigation should also be made into the quantity of milk which is necessary for the optimum retention of calcium and phosphorus, while the effect of variations in the vitamin D intake should also be studied. In this way there could be built up a body of knowledge which would not only be of great value in determining the relative merits of raw and pasteurized milk in infant feeding, but which would furnish a useful guide to pediatricians in the more general field of infant dietetics. —J. S. Stirling and J. H. Blackwood. The Nutritive Properties of Milk in Relation to Pasteurisation. Hannah Dairy Research Institute, *Bull. 5*, p. 75.

The Treatment of Water by Certain Forms of Silver

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IN Canada and the United States one seldom hears of any process other than filtration and chlorination recommended for the treatment of polluted water supplies. Recently a new method involving the use of silver, has been receiving considerable attention, especially in Europe. The apparatus designed to apply this new process is now sold in Canada and presumably in the United States, and it is believed that patent rights for this new method have been issued.

This process depends upon the so-called oligodynamic action of silver. It is a well-known fact, first reported by Naegeli in 1893, that silver metal exerts an inhibitive action toward bacteria, algae and certain other forms of microscopic life. The term "oligodynamie," coined by Naegeli, is used to define that bactericidal action of silver, copper, mercury, etc., and their salts, which occurs in such a dilute concentration that a chemical determination is extremely difficult. In fact for many years the inhibitory action of the metals was thought to be mysterious, but it is now generally accepted that the metals act only through the solution of traces of salts or oxides on their surface. When water is exposed to metallic silver it develops oligodynamic properties reaching a maximum in about eight days, but if the area of metal exposed to water is increased many hundreds of times the time factor is greatly reduced.

In this new process silver with or without certain "activators" such as palladium or gold, is deposited on the surface of sand, porcelain, or filter candles. Water is then passed through the filter or allowed to remain in contact with the silvered porcelain for a certain time. Very striking claims are made for this method:

(1) There is no taste, odor or color to water treated by this method.
(2) Water which has been exposed to silver has the power of sterilizing other polluted water mixed with it.
(3) It is claimed to sterilize polluted water independent of the temperature of exposure.
(4) There is no reduction in the efficiency of this new process by the presence of minerals or organic matter in the water.
(5) The quality of the water is only of importance when it contains much suspended matter.
(6) It is recommended for the treatment of water in swimming pools, laundries, drains, ice plants, etc.
(7) Certain claims for medicinal application are made.

It will be seen that *if* this process is all that is claimed for it, we have available the ideal method of treating polluted water.

It is well at this stage to point out that although this process has important limitations, it has some points in its favor, and, in the author's estimation, is worthy of considerable further research.

As regards "oligodynamie" in gen-

eral, there have been at least 200 publications dealing with various phases of the problem.

Suckling[1, 2] studied this method of treating water and concluded that "it is a delicate process susceptible to interference by many factors such as temperature, turbidity, sulphides, chlorides, iron and organic matter. As far as public water supplies are concerned, the process is applicable to few and carefully selected cases. It is superior to chlorination in certain minor respects such as the entire absence of odor and taste production." He believes that it "may meet a long-felt need as a means of sterilizing water in the case of small supplies, country homes, etc."

It seemed desirable to obtain some first-hand data regarding this new process, while for comparison, studies on silver-plated porcelain, colloidal silver and silver nitrate were included.

One specimen of the commercial apparatus was obtained. The sterilizing elements consisted of small unglazed porcelain rings, each approximately 1.5 cm. in diameter, 1.5 cm. deep, the walls 0.2 cm. thick. These rings had silver in some form, presumably metallic, on the surface. Upon breaking a ring and heating it with H_2S, marked discoloration occurred at the surface only and it is therefore concluded that silver was deposited only on the surface. A quantitative determination of silver on 1 ring indicated 7.5 mg. There is undoubtedly considerable variation, as microscopic and macroscopic examination showed a considerable unevenness in deposit. The apparatus, which was designed to treat, by contact, 1,300 c.c. of water, contained approximately 400 rings. The directions were simply to rinse the jar, fill with water, allow to stand two hours, when the water would be found to be sterile unless it had approached sewage in its degree of contamination, in which case 6 to 7 hours would be necessary.

Preliminary experiments were done with the sterilizer as sold by the manufacturers. The jar was filled with tap water to which enough of broth culture of *B. coli* or *B. typhosus* was added to give approximately 1 million viable organisms per c.c. The test was conducted at 22° C. At half-hour intervals 5 c.c. of water were removed from the jar and inoculated into Smith fermentation tubes of lactose broth. Growth occurred from samples removed after one hour, but all cultures were negative after two hours' exposure. Those tubes which showed no growth were then reinoculated with the test organism, in order to determine whether or not enough of the inhibitive material might be carried over to prevent growth. In every case excellent growth took place. It was concluded that the process warranted further study.

It was considered advisable to remove the silvered rings from the apparatus for experimental purposes, and place them in 400 c.c. pyrex beakers for further study, in order that they would not all be affected by some special experiment. In addition broken porcelain insulators and later porcelain rings, plated with silver by one of the usual chemical reduction methods, were used in identical experiments.

Distilled water suspensions of 24 hour broth cultures of *B. coli* were used. Five c.c. amounts of the suspension were removed at half-hour intervals and inoculated into lactose broth Smith fermentation tubes. In this report "sterility" means that growth did not occur when the sample was inoculated into lactose broth and incubated at 37° C. for 48 hours.

At room temperature (22° C.) water with approximately 2 million *B. coli* per c.c., was sterilized by silvered commercial rings in slightly less than four hours; at 37° C. in two hours, while at 10° C. not even after 22 hours. Identical results were obtained with the

silvered rings prepared in the laboratory.

A variety of experiments was conducted, during which it seemed as if both the commercial and the laboratory rings were losing their efficiency, so a comparison was made with new rings. Sterility was obtained at room temperature within four hours with the used rings, but in two hours with the new ones.

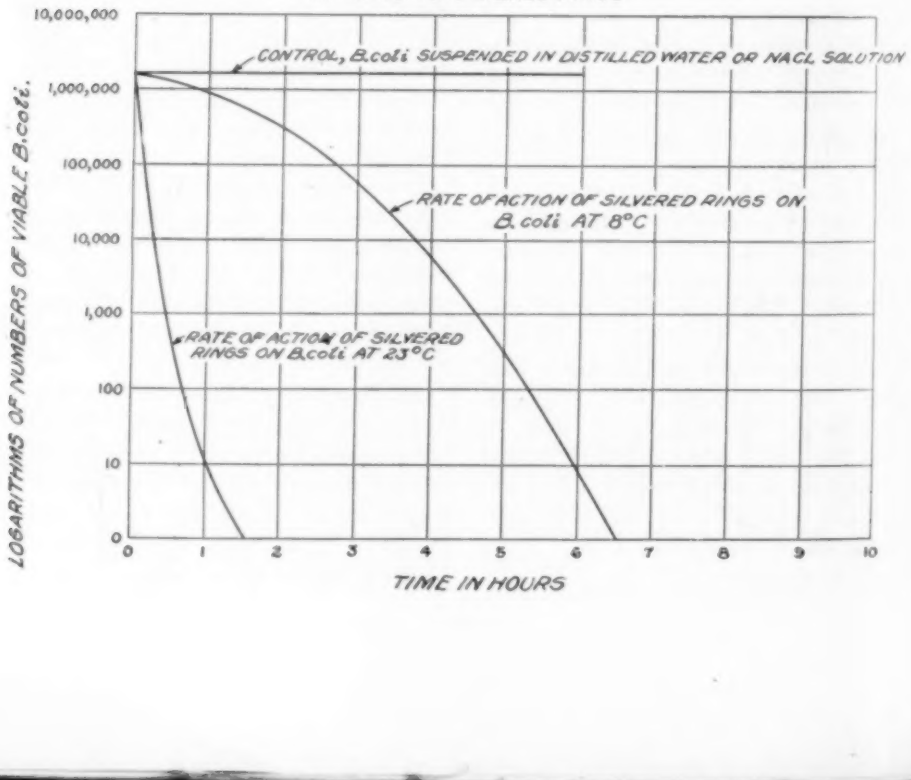
These results were repeated several times and indicated that under continued use there is a gradual loss of efficiency of both commercial and laboratory rings. It was believed that the use of broth cultures in preparing the suspensions of *B. coli* for test purposes might be a factor through the addition of organic matter. Only 1 to 2 c.c.'s of a broth culture were used to prepare a litre of suspension, and this quantity of broth would represent very little organic matter. In order to avoid objections on this point, all further suspensions were, unless otherwise stated, prepared from *B. coli* grown on an agar slant and filtered through paper. Even under these conditions there is a gradual loss of efficiency of the rings.

It was also found that when the bacterial content was greatly increased, there was a corresponding increase in the time necessary for sterilization. Water with 500,000 *B. coli* might be sterilized at room temperature within 1½ hours, but with 10,000,000 per c.c. may take ten hours. Although it is possible that the same rate of action on *B. coli* took place in both samples, the result was a greatly increased time.

Temperature plays an important rôle in sterilization. Distilled water containing a suspension of *B. coli* may be sterilized in from 1½ to 2 hours at 22° C., while at 8° it may require six or seven hours, indicating that even with the most favorable type of water the temperature is a very important factor.

Sixteen experiments were conducted to determine rates of reduction in the

FIGURE 1.
RATE OF REDUCTION IN NUMBERS OF VIABLE B. coli EXPOSED TO SILVERED RINGS


10,000,000
1,000,000
100,000
10,000
1,000
100
10
0
CONTROL, B.coli SUSPENDED IN DISTILLED WATER OR NACL SOLUTION
RATE OF ACTION OF SILVERED RINGS ON B. coli AT 8°C
RATE OF ACTION OF SILVERED RINGS ON B.coli AT 23°C
LOGARITHMS OF NUMBERS OF VIABLE B.coli.
0 1 2 3 4 5 6 7 8 9 10
TIME IN HOURS

number of *B. coli* suspended in distilled water when exposed to silvered rings at room and refrigeration temperatures. Control experiments were conducted on *B. coli* suspended in distilled water and 1 per cent sodium chloride. The cultures for these control tests were grown on either sodium chloride free agar or 1 per cent sodium chloride agar. A semi-logarithmic graph (Figure 1) shows these results to the best advantage.

Table I shows the silver content of water exposed to silvered laboratory and commercial rings. The spectrograph was employed.

TABLE I

SPECTROGRAPHIC QUANTITATIVE DETERMINATIONS OF SILVER IN WATER *

Water exposed to silvered commercial rings	*Silver in parts per million*
After 1 hr. exposure	0.03 p.p.m.
After 2 hrs. exposure	0.07 p.p.m.
After 4 hrs. exposure	0.15 p.p.m.
After 8 hrs. exposure	0.5 p.p.m.
Water exposed to silver plated laboratory rings	
After 1 hr. exposure	0.125 p.p.m.
After 4 hrs. exposure	0.2 p.p.m.

* Acknowledgment is gratefully expressed to Mr. J. Dick for conducting these analyses.

It will be seen that the quantity of silver in the water increases with the length of exposure.

Silvered commercial and laboratory rings which have become inactivated can be revived by treating with 10 per cent HCl for one hour and then thoroughly washing. It is difficult to determine whether or not this so-called oligodynamic effect is metallic in nature or due to traces of soluble salts or oxides on the surface. Hydrogen ion concentration was not a factor after this treatment.

The effect of light on silver plated laboratory rings was studied at room temperature. Two dishes with 1 layer of rings were prepared. One was kept in a dark room and 1 in daylight, but away from direct sunlight. The temperature, bacterial count, condition of rings and method of sampling were as nearly identical as possible. It was found that the rings were not as active in the light as in the dark. The difference in time necessary to sterilize a *B. coli* suspension varied considerably, and was found to be as much as one hour longer for those rings kept in the light. Unfortunately, rate curves were not prepared. It was quite evident that there is some photo-effect which needs further study.

When comparisons were made between sterile raw water and sterile distilled water to which was added a filtered 24 hour culture of *B. coli* to approximate 1 million per c.c., the organisms suspended in distilled water were killed or rendered inactive more quickly by silver plated rings than those in raw water. This indicates that the nature of the water treated markedly affects the results. That this difference was not due to distilled water against raw water is shown by the normal death rate of *B. coli* suspended in distilled water (Figure 1).

Several experiments were conducted in an attempt to determine whether or not the organisms are actually killed by exposure to silver. Thus far it has not been possible to obtain any definite evidence of revival, although doubtful results were obtained in one test. Further work is indicated in light of the reported revival of organisms exposed to copper.

Sterile distilled water was exposed to silvered laboratory porcelain rings for several hours, removed and its action against *B. coli* determined. It was found that it had acquired considerable sterilizing effect, as would be expected from the spectrographic determination

of the silver content of exposed water (*vide supra*).

SILVER NITRATE

The action of silver nitrate was also studied. The dilutions are expressed on the basis of the silver ion-content.

It was found that in a dilution of 1 in a million silver nitrate sterilized water containing a million and a quarter *B. coli* per c.c. in less than ½ hour, while a 1 in 10 million required 1½ to 2 hours at 22° C. and 2½ to 3 hours at 8° C. The effect of temperature on the action of silver nitrate on *B. coli* is not as great as in the case of either the silvered rings or colloidal silver. It was noted, strangely enough, that 0.1 per cent normal horse serum seemed to increase the rate of action.

The effect of light was also studied but no difference could be noted between experiments conducted in the dark and those conducted in the light.

Another series of interesting experiments was conducted with silver nitrate. Tubes of lactose broth were prepared with a 1 in 100,000 concentration of silver nitrate. A definite number of organisms was added to each tube and incubated at 37° C. No growth was obtained in any tube inoculated with less than 200,000 *B. coli*, while all inoculated with 200,000 or more grew. A concentration of 1:10,000 $AgNO_3$ prevents growth in a tube inoculated with 100 million *B. coli*. A set of tubes was prepared with 1:100,000 silver nitrate and allowed to stand at incubator temperature for 48 hours and at room temperature for ten days. They were then inoculated with varying numbers of *B. coli*. A control set without silver nitrate was inoculated with a similar number of *B. coli*. All of the control tubes showed growth within 24 hours. Those which had silver nitrate added, and were inoculated with 200 or more showed excellent growth, but growth was prevented when only 20 *B. coli* were used. The difference noted between this experiment and the first one described suggests that the combination of $AgNO_3$ with something in this broth results in inactivation.

COLLOIDAL SILVER

The action of silver sols on bacteria has been studied by Marshall.[3] He reported that silver nitrate was more active than silver sols, *i.e.*, that silver nitrate calculated as 1 part of silver in 3,200,000 killed *B. typhosus* in 10 minutes, whereas a silver sol containing 1 part silver in 25,000 failed to kill in 15 minutes, but killed in 30 minutes. Marshall used Bredig's method, which produces particles of various sizes, most of which are so large that they readily precipitate. In this research a new electric dispersion method described by Fraser and Gibbard[4] was used, by which a clear, yellow, silver sol was prepared. It was found that the concentration of silver in an effective silver sol was of the same order as the concentration of silver as silver nitrate, producing similar results. In addition, the concentration of silver in water exposed to silvered commercial rings or silver plated rings was also of the same order. A concentration of silver (colloidal silver) of one in 10 million in distilled water produces sterility in 3½ hours at 23° C., and in 6 hours at 8° C. It was found that the action of colloidal silver on *B. coli* is affected by the presence of organic matter and temperature of exposure.

It is believed, therefore, that colloidal silver has an inhibitory or oligodynamic action similar to that of silvered commercial rings, or silver plated porcelain.

SILVER CHLORIDE AND FUSED SILVER CHLORIDE (HORN SILVER)

The effect of silver chloride was studied in a few experiments, with results similar to those obtained with

silver nitrate. A concentration of 1 part of AgCl in a million parts of distilled water sterilized a million *B. coli* per c.c. in 2½ hours.

Horn silver, or fused silver chloride, had a more rapid action, producing sterility in ½ to ¾ of an hour. However, quantitative determinations of the solubility of fused silver chloride were not made; consequently the results are not quite comparable.

METALLIC SILVER

The action of metallic silver in agar plates heavily seeded with *B. coli* was studied.

Pure sheet silver was obtained (99.98 per cent pure); a small strip as first obtained was placed in an agar plate. A zone of inhibition ¼ inch wide surrounded the silver after 24 hours' incubation. Another experiment was set up in which strips ¼ inch wide and 1 inch long were used. One strip was cleaned by fine emery paper, another was heated to a red heat in a bunsen flame and a third was held above the tip of the flame for about one minute. Neither the cleaned silver nor that heated to redness gave any zone of inhibition, while one held over the flame gave a zone of inhibition at least ¼ inch wide. The inference is, of course, that the inhibitory or oligodynamic action on *B. coli* is due entirely to traces of salts, oxides or sulphides on the surface.

After some days a plate which had shown a zone of inhibition was seen to have colonies growing in the clear zone. It is suggested that there is a distinct possibility of developing silver-resistant strains of *B. coli*. This point has not been studied, but will be kept in mind in future work.

MISCELLANEOUS EXPERIMENTS

One. A number of flasks and beakers, some of which were etched with hydrofluoric acid, were plated with silver by the same chemical reduction process used for plating the porcelain. It was found that quite good oligodynamic action was secured. The rate of action was definitely co-related with the ratio between the capacity of the beaker and its wall area. The narrower the ratio between surface and volume the more quickly were the organisms affected. The suspension contained 700,000 *B. coli* per c.c. The experiment was conducted at room temperature. The main objection to this process from a practical point of view is that the silver plating on polished or etched glass did not adhere under the usual washing and cleansing conditions with soap and water.

Two. Double distilled water exposed to silver plated laboratory rings forty hours was boiled down from 500 c.c. to 10 c.c. and immediately diluted to 500 c.c. A suspension of *B. coli* was added to give a count of approximately 2 million per c.c. In addition, two control experiments were conducted with water exposed to silver which had not been boiled. The test was conducted at 22° C. It was found that while *B. coli* failed to grow after six hours' exposure to the control "silver" water, excellent growth was obtained after 24 hours' exposure to the boiled "silver" water.

SUMMARY

1. Distilled water suspensions of *B. coli* are apparently killed by exposure to silvered porcelain rings, without affecting color, odor or taste of the water.

2. There is a very definite time factor for silvered commercial rings and silvered laboratory rings to affect *B. coli* even under optimum conditions.

3. Although definite evidence of revival of organisms exposed to silver has not been obtained, further investigation is necessary before any final conclusion can be made.

4. The quantity of silver in water ex-

posed to silvered commercial rings, or to silver plated laboratory rings increases with the time of exposure, introducing another variable factor.

5. The presence of organic matter markedly increases the time of exposure necessary to prevent subsequent growth of *B. coli*.

6. The temperature of exposure markedly affects the rate of action of silvered rings, the sterilizing time increasing with lowered temperatures.

7. Rings which become inactive may be reactivated by treating with dilute HCl.

8. Silvered laboratory rings are more active in the dark than in the light.

9. Water which contains silver after exposure to silver plated porcelain has, as would be expected, the ability to inactivate *B. coli* added to it.

10. The effect of light on the action of silver nitrate on *B. coli* was studied, but it was found that under the most carefully controlled conditions there was no difference.

11. The concentration of silver in water exposed to silvered rings which is effective against *B. coli* is of a similar order as the effective concentration of silver in a silver nitrate or silver chloride solution and colloidal silver.

12. In general those factors which affect the so-called oligodynamic effect of silver metal also affect the action of the other forms of silver studied.

CONCLUSIONS

It may be concluded, as a result of these laboratory studies, that although the application of the oligodynamic action of metallic silver to the treatment of water has some points of considerable interest, it cannot at the present time be recommended for practical use. Temperature, organic and inorganic constituents definitely influence the "oligodynamic" action of silver toward *B. coli* to a degree which renders the results unsatisfactory for practical application.

Furthermore, the definite, rather prolonged time factor which markedly increases under unfavorable conditions, necessitates constant and careful bacteriological control. The lack of a simple, delicate test for silver would require water to be stored until a bacteriological analysis could be completed.

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A Study of the Opsono-Cytophagic Power of the Blood and Allergic Skin Reaction in Brucella Infection and Immunity in Man*

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IN a series of studies which the writers have been conducting for the past two years, in connection with the phenomenon of phagocytosis and allergic reactions in Brucella infection in man and animals, evidence has been obtained to the effect that one of the most important indications of infection with, and immunity to, Brucella in man is the phagocytic response of the blood based on measurements made *in vitro* in an opsono-cytophagic system and the existence of a state of allergy as determined by an allergic skin test.

Since the widespread occurrence of undulant fever in man in the United States was established, considerable attention has been given to the diagnosis of the disease, chiefly by cultural, serological and allergic methods. There are being accumulated data which indicate that the methods of diagnosis just mentioned are not always satisfactory in detecting many cases of the disease in man. Again, there are times when the results of the serological or allergic tests are misleading which in turn may result in an incorrect diagnosis.

Many physicians often observe the occurrence of a symptom-complex in patients not unlike that of acute or chronic undulant fever. One may be confused in making a diagnosis because, if Brucella infection is suspected, it might easily be ruled out on the basis of a negative blood, stool and urine culture, and negative agglutination test. If in addition to these examinations an intradermal test is performed with a suitable agent and a positive reaction is obtained, this evidence alone is not sufficient to warrant a diagnosis of undulant fever. The diagnosis remains uncertain because all individuals who have been infected with Brucella as well as those who are actively infected will show an allergic skin reaction to a satisfactory Brucella allergin.

Confusion may again arise when individuals who are ill or who are apparently healthy are found to have Brucella agglutinins in their blood serum. Those comprising this group are chiefly laboratory workers, practising veterinarians, farmers and packing house employees. By way of illustration let us consider the status of practising veterinarians toward the disease. Those who are engaged in cattle practice come in contact with *Br.*

* Read before the Laboratory Section of the American Public Health Association at the Sixty-first Annual Meeting in Washington, D. C., October 27, 1932.

abortus to a greater extent than any other single group of people. It has already been shown by serological and intradermal tests made on veterinarians in Europe and this country, that a considerable percentage have Brucella agglutinins in varying degrees in their blood and give a positive intradermal test. While very few of them give a history of having a clinical course of the disease, many report the occurrence of skin eruptions and malaise after removing retained placentas from aborting cows. The malaise is usually characterized by dullness, head-ache, sweating, aching in the muscles and joints. There may occur an elevation of the temperature. These symptoms may also occur from the ingestion or inhalation of the organism alive or dead, or of sterile broth filtrates on which the organism has grown. It is necessary, of course, that these materials pass through the epithelium of the skin, or the respiratory or digestive tract. Individuals in the general population as well as those in particular groups may show the symptoms just mentioned when exposed to Brucella.

We have conclusive evidence that all of those individuals who recover from Brucella infection, be it clinical or subclinical, are left sensitive and in some cases hypersensitive to Brucella, perhaps for several years. Such individuals show not only a local reaction to the intradermal test when made, but may show symptoms exactly like those seen in typical undulant fever as well. The differentiation of such cases from active infection with Brucella, or from many other diseases characterized by similar symptoms, has been a difficult problem to the clinician.

In attempting to arrive at a satisfactory method of detecting Brucella infection in those who do not show agglutinins in their blood and of clarifying the status of those individuals who show symptoms characteristic of the disease when exposed to Brucella or to protein fractions of the organism, it was thought that a study of the phagocytic power of the blood in conjunction with an allergic skin test might possibly furnish considerable information on these problems and clarify the diagnosis of Brucella infection in many cases.

The literature is rather extensive on the phenomenon of phagocytosis and its meaning with respect to infection and immunity in other bacterial diseases. The application of allergic skin tests in detecting Brucella infection has also been given considerable study by many workers. Space does not permit at this time a review of the literature on all the important accomplishments in these directions.

Definite evidence was obtained during the course of these studies to support the view held by many others that a more accurate determination of an individual's actual phagocytic response to bacterial invasion may be gained by the use of whole blood, rather than by using the serum plus washed leucocytes of another individual or species of animal. In view of this fact the whole blood method was adopted for determining phagocytic response in Brucella infection and immunity in man in preference to the commonly used Wright and Douglas [1] opsonic index method.

Shortly after beginning this study we were surprised to find that the polymorphonuclear cells in whole defibrinated blood of many adults, regardless of their history as respects Brucella infection, show a decidedly marked ingestion of any of the three species of Brucella *in vitro* in a phagocytic system. Later it was found that when a certain amount of sodium citrate is added to a given specimen of whole blood, phagocytosis of Brucella is either inhibited, retarded or unaffected. The degree of phagocytosis that obtains

depends upon the history of the individual as respects Brucella infection. Hektoen and Ruediger [2] many years ago found that a great many other salts as well as sodium citrate, when added to whole blood in low concentrations, will retard or inhibit phagocytosis of certain bacteria. They succeeded in showing that the salts affected the opsonic property of the serum rather than the activity of the leucocytes.

We have found that the concentration of sodium citrate that is necessary to inhibit phagocytosis in whole blood varies with different species of animals. That is, a certain concentration of sodium citrate in the blood from one species of animal may prevent phagocytosis of Brucella altogether, but may not have the same degree of inhibiting action when added to the blood of another species of animal. By taking advantage of the inhibiting action of sodium citrate on phagocytosis, and applying it to a study of the opsono-cytophagic power of the blood of humans as respects Brucella, we find a marked difference in the opsono-cytophagic activity of the blood from the susceptible, from the infected and from the immune. In other words, one can measure an individual's status with respect to Brucella infection by determining the opsono-cytophagic power of the whole citrated blood *in vitro* for Brucella.

The concentration of sodium citrate in whole blood which has thus far given the most favorable results in determining gradations or degrees of phagocytic response toward Brucella sufficient for differentiating between the susceptible, the infected, and the immune is 0.8 per cent. If the concentration of sodium citrate in the blood is varied from the stated amount, differentiation between the three groups is not obtained.

In determining the phagocytic activity of whole blood, Glynn and Cox [3] coined the word "opsono-cytophagic" to indicate the phagocytic activity of blood in the presence of serum opsonins and homologous leucocytes. This expression has been adopted to describe the phenomenon with which this study deals. A description of the technic that has been employed and the results of the study follow.

METHODS OF STUDY

Determination of Opsono-Cytophagic Power of Blood. The method which we have adopted for determining the opsono-cytophagic power of blood for Brucella is a modification of the Leishman [4]-Veitch [5] technic. The modified technic consists of mixing equal quantities of a citrated (0.8 per cent) fresh blood and a heavy bacterial suspension of living organisms in small Wassermann tubes, incubating at 37° C. for 30 minutes, and subsequently making spreads and staining with Hastings stain. The addition of a definite amount of sodium citrate prevents clotting of the blood and inhibits the action of Brucella opsonins which are present in the serum of many normal individuals.

Preparation of Blood Specimen. The blood specimens on which the test is to be made are collected in 5 c.c. amounts in glass vials in which has been placed 0.2 c.c. of a 20 per cent solution of sodium citrate in physiological salt solution. The final dilution of sodium citrate that obtains in the blood is 0.8 per cent. The test should be conducted on the specimens within six hours after collection provided they are kept in a cool place. The polymorphonuclear cells in blood disintegrate very rapidly when it is kept warm for two or three hours. The specimens should be thoroughly shaken directly before mixing with the bacterial suspension.

Bacterial Suspension. The bacterial suspension is prepared fresh each day by suspending several loopfuls of the

growth from a 48 hour liver agar slant culture in sterile physiological salt solution of pH 7. The turbidity of the suspension should give a reading of approximately 2 cm. when measured with the Gates apparatus.[6] Suspensions of any of the three species of Brucella are suitable regardless of virulence.

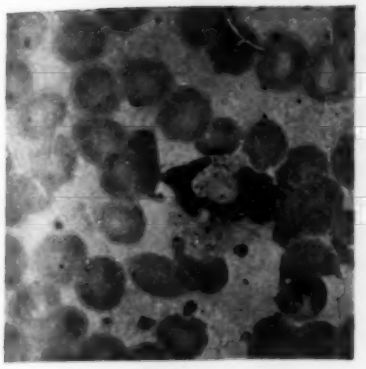
The Test. Into clean small glass vials, such as are used for the agglutination or Kahn test, are placed 0.1 c.c. of the whole blood and 0.1 c.c. of the bacterial suspension. After mixing thoroughly, the vials are placed in an incubator for 30 minutes at 37° C. Certain strains of Brucella tend to become "fast" to ingestion by the cells after being transferred daily for many weeks. If a culture is being used daily for the test, it should be checked frequently for "fastness" to phagocytosis against whole citrated blood from a known immune person. Continuous agitation during the period of incubation tends to inhibit phagocytosis. Considerable sedimentation of the blood cells takes place during the incubation period. The cells should not be resuspended by shaking after the period of incubation. Directly after removing the tubes from the incubator, a small amount of the sedimented cells is removed by means of a finely drawn capillary pipette to which is attached a small rubber bulb. A drop of the cells is placed at one end of a thoroughly cleaned and polished glass slide, and drawn across the slide by placing the end edge of another slide at such an angle that the spread thins out and terminates at or near the middle. In a spread of this type, most of the leucocytes may be found near the terminating edge of the spread. The blood film should be dried as rapidly as possible to prevent shrinking of the leucocytes. Rapid drying may be obtained by placing the slides in front of a small electric fan. A small heating unit from an electric heater, if attached to the front of the fan and operated simultaneously, will greatly increase the speed of drying.

Staining Spreads. The slides are placed face-upward on a suitable rack and the spreads covered with 0.5 c.c. of Hastings stain. After an exposure of 15 seconds, 1 c.c. of distilled water is added to the stain on the slide. At the end of 10 minutes, the spread is gently washed free from stain with distilled water and dried in front of an electric fan.

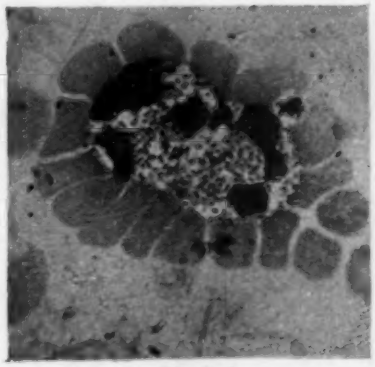
Estimation of the Degree of Opsonocytophagic Activity. The size of the organism in question and the marked degree of phagocytosis which occurs in cells from immunes has necessitated the employment of a different system of recording phagocytic activity from that which is commonly used in studies of this nature. In routine work, a total of 25 cells is counted in different sections of the spread and each cell is recorded as negative when no phagocytosis occurs, as slight when from 1 to 20 bacteria are seen in the cell, as moderate when from 21 to 40 bacteria are found in a cell, and marked when the number of bacteria in the cell is above 40. The bacteria are so numerous in those cells showing marked phagocytosis that it is impossible to count all of them. Examples of different degrees of phagocytosis of Brucella are shown in Plate I.

It is realized that the foregoing method of measuring degrees of phagocytosis is only approximate. It was adopted after making thousands of examinations by different methods.

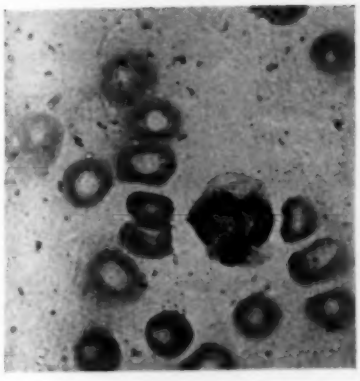
Brucella Allergic Skin Test. The agent used in making the allergic test was developed by Hershey in our laboratory during his study of the chemistry of Brucella. It is a soluble nucleo-protein fraction of the three species of Brucella in 1-1000 dilution in slightly alkaline physiological salt solution. The test is made by injecting



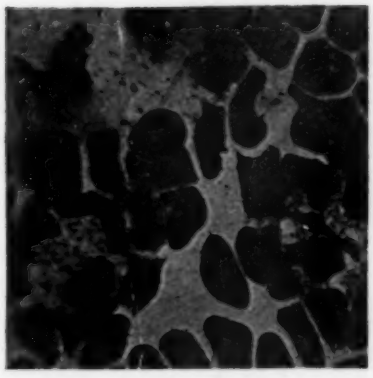
Slight



Marked



Negative



Moderate

PLATE I

DEGREES OF PHAGOCYTOSIS OF BRUCELLA

about 0.1 c.c. of the fluid intracutaneously in the lateral surface of the forearm, using a 26 gauge needle. The size of the local reaction, which is characterized by a circumscribed erythema and slight edema, may vary from 1 to 2 inches in diameter and appears within 24 hours after injection. It may persist for 48 to 96 hours. There is no necrosis or sloughing of the tissue at the point of the local reaction. In the infected, the local reaction may be accompanied by a more marked manifestation of symptoms. Those that are hypersensitive will show a terrific symptomatic reaction along with the local reaction. Those that have not been sensitized to Brucella and who are probably susceptible to infection show no systemic reaction. Often one sees in certain individuals an erythema, about one-half inch in diameter with no edema around the point of the injection. It has the appearance of a nonspecific reaction.

RESULTS OF STUDY

Results on Blood Specimens from Cases Diagnosed as Undulant Fever. Each of the 19 cases presented in Table I has shown clinical symptoms similar to those seen in acute and chronic undulant fever before a laboratory diagnosis of the disease was made. The laboratory diagnosis was based on either a positive blood culture or on the combined results of the agglutination, allergic and opsono-cytophagic tests. In the absence of a positive blood cul-

TABLE I

OPSONO-CYTOPHAGIC POWER OF BLOOD FROM CASES DIAGNOSED AS UNDULANT FEVER

Case No.	Sex	Approximate Date of Onset	Aggl. Titer	Allergic Skin Test	Activity of Cells Date	Number Ma.	Mo.	S.	N.*
1	Male	12–'29	12/19/31 + 1/500	12/19/31 Pos.	12/19/31	0	8	10	7
2	Male	2–'31	4/13/31 + 1/500	None made	4/13/31	0	0	4	21
3	Female	3–'31	5/15/31 + 1/500	3/15/31 Pos.	5/15/31	0	0	10	15
4	Male	7–'31	12/ 4/31 Neg.	12/ 4/32 Pos.	12/ 4/32	0	0	0	25
5	Male	11/10/31	1/18/32 + 1/500	1/18/32 Pos.	1/18/32	0	0	5	20
6	Male	1/18/32	2/17/32 + 1/500	2/17/32 Pos.	2/17/32	6	4	15	0
7	Female	5–'30	4/ 7/32 Neg.	4/ 7/32 Pos.	4/ 7/32	0	0	0	25
8	Male	2/20/32	4/13/32 + 1/500	4/15/32 Pos.	4/15/32	0	2	3	20
9	Male	4/ 3/32	4/21/32 + 1/500	4/21/32 Pos.	4/21/32	0	0	21	4
10	Boy	3/10/32	5/15/32 + 1/500	5/15/32 Pos.	5/15/32	0	4	8	13
11	Female	5/ 1/32	5/16/32 + 1/500	5/16/32 Pos.	5/16/32	0	3	5	17
12	Male	4/10/32	5/16/32 + 1/500	5/16/32 Pos.	5/16/32	0	6	6	13
13	Male	3/20/32	5/16/32 + 1/500	5/16/32 Pos.	5/16/32	1	2	4	18
14	Male	6/ 7/32	6/ 9/32 + 1/500	6/ 9/32 Pos.	6/19/32	3	4	14	4
15	Female	6/10/32	6/24/32 + 1/500	6/24/32 Pos.	6/24/32	0	2	19	4
16	Male	6/ 1/32	6/30/32 + 1/500	6/30/32 Pos.	6/30/32	0	3	22	0
17	Female	2–'30	7/ 7/32 Neg.	7/ 1/32 Pos.	7/ 7/32	3	4	15	3
18	Girl (3 yrs.)	6/30/32	7/11/32 Neg.	7/11/32 Pos.	7/11/32	0	0	0	25
19	Infant (17 mo.)	7/19/32	7/22/32 Neg.	7/22/32 Pos.	7/22/32	0	0	4	21

* Ma.=Marked phagocytosis
Mo.=Moderate phagocytosis
+=Complete agglutination
S.=Slight phagocytosis
N.=No phagocytosis

ture and positive agglutination test, the diagnosis was made on the basis of the results of both the allergic skin test and opsono-cytophagic test. No diagnosis was based on these two tests until sufficient data were accumulated from previous studies to warrant their application to the diagnosis of undulant fever.

The laboratory tests and allergic skin test were used in the diagnosis of the disease within a few days after the onset of symptoms in a few cases, while in others the interval varied from six weeks to approximately two years.

Brucella melitensis was isolated from the blood of cases Nos. 3, 14 and 15. These were laboratory infections. *Brucella abortus* was isolated from the blood of cases Nos. 5, 8, 9, and 13. Blood cultures from the remaining 12 cases were negative.

It may be noted from the data presented in Table I that the opsono-cytophagic power of the blood is low or absent in all cases with the exception of No. 6. This individual had a comparatively mild form of the disease as expressed in terms of clinical symptoms. Experience with this test has shown that the phagocytic power rises and falls during the course of the disease. If the invading organism is very active in the body, the phagocytic activity of the cells is likely to be low. On the other hand, if it is not very active, as indicated by clinical symptoms, the phagocytic activity of the cells will be found higher.

In view of the fact that many individuals, either healthy or ill, will show an allergic skin reaction to Brucella due to previous infection, one might question a diagnosis of undulant fever based on a positive allergic skin test and low or negative opsono-cytophagic test in a patient in the absence of a positive blood culture and negative agglutination test. We have given considerable attention to this question in our studies.

The contention that a diagnosis of undulant fever can be made on the basis of the two tests in question is supported by the data which are to follow concerning the degree of ingestion of the organism on the part of the cells in blood examined shortly after and long after recovery from the disease, as compared to that which takes place in the blood from patients during the course of the disease. Furthermore, it is supported by the fact that those cases in question respond to specific treatment with either Brucellin or Pyronin, or both, when administered simultaneously and the cells in whole citrated blood show marked phagocytosis of Brucella.

Comparisons of the Results of Blood Examinations Made on Patients During and After Recovery from Undulant Fever. The comparative results are illustrated in Table II on eight known cases of undulant fever. The opsono-cytophagic test was made during the disease from two days to two months after the onset. The time of making the test on each case after recovery, varied from two days to approximately one month. The evidence on which recovery from the disease is determined is the complete disappearance of all those clinical symptoms by which it is characterized.

The data clearly show that the opsono-cytophagic power of the blood is low during the disease and becomes very marked after recovery.

Results of the Examination of Blood from Individuals Known to Have Had Undulant Fever. In Table III are illustrated the results of the opsono-cytophagic test and agglutination test on 15 individuals after recovery from undulant fever. These cases are not included in the group in Table II. The tests were made at intervals varying from 36 days to four years after recovery from the disease.

The opsono-cytophagic power of the blood for Brucella is very marked in all cases, regardless of the length of the interval between recovery and the phagocytic examination. It is interesting to note that there is no relation between Brucella agglutination titer of the individual's serum and the ingestion capacity for Brucella of the leucocytes suspended in the serum.

All individuals whose blood shows a marked opsono-cytophagic power for Brucella *in vitro* similar to that in those cases illustrated in Table III, will also show an allergic skin reaction to the same degree as those that are infected with Brucella when tested by a satisfactory Brucella allergin. The blood of the infected, however, will not show

TABLE II

OPSONO-CYTOPHAGIC POWER OF BLOOD OF CASES DURING AND AFTER RECOVERY FROM UNDULANT FEVER

		Activity of Cells During Infection					*Activity of Cells After Recovery*				
			Number					*Number*			
Case No.	*Period of Disease*	*Date*	*Ma.*	*Mo.*	*S.*	*N.**	*Date*	*Ma.*	*Mo.*	*S.*	*N.**
1	11/10/31 to 1/30/32	1/18/32	0	0	5	20	2/ 5/32	25	0	0	0
2	2–'31 to 4/20/32	4/13/32	0	0	4	21	4/23/32	23	0	2	0
3	2/20/32 to 4/26/32	4/15/32	0	2	3	20	5/15/32	23	2	0	0
4	3/20/32 to 5/18/32	5/15/32	0	4	8	13	6/11/32	25	0	0	0
5	4/10/32 to 7/15/32	5/16/32	0	6	6	13	7/23/32	25	0	0	0
6	3/20/32 to 5/26/32	5/16/32	1	2	4	18	6/11/32	19	6	0	0
7	6/ 7/32 to 6/20/32	6/ 9/32	3	4	14	4	7/26/32	25	0	0	0
8	6/10/32 to 7/ 5/32	6/24/32	0	2	19	4	7/ 7/32	25	0	0	0

* Ma.=Marked phagocytosis
Mo.=Moderate phagocytosis
S.=Slight phagocytosis
N.=No phagocytosis

TABLE III

OPSONO-CYTOPHAGIC POWER OF BLOOD OF INDIVIDUALS AFTER RECOVERY FROM UNDULANT FEVER

Case No.	Sex	Period of Disease	Activity of Cells Number Date	Ma.	Mo.	S.	N.*	Agglutination Test Date	Titer
1	Male	1–'30 to 4–'30	2/ 4/31	21	0	0	4	2/14/31	+ 1/25
2	Male	12–'26 to 4–'27	4/ 1/31	25	0	0	0	4/ 1/32	+ 1/25
3	Male	1–'26 to 12–'26	4/17/31	22	1	2	0	4/17/31	—
4	Male	7/ 3/30 to 7/15/30	4/17/31	22	2	0	1	4/17/31	—
5	Male	1–'28 to 4–'28	4/17/31	21	2	1	1	4/17/31	+ 1/50
6	Female	5/ 5/30 to 5/25/30	4/20/31	22	0	3	0	4/20/31	+ 1/25
7	Male	5–'30 to 6–'30	4/29/31	24	0	1	0	4/29/31	+ 1/50
8	Female	5/ 1/32 to 5/31/32	5/31/32	25	0	0	0	7/23/32	+ 1/500
9	Female	3–'31 to 5/25/31	5/31/31	25	0	0	0	5/31/31	+ 1/500
10	Male	12/ 6/29 to 1/15/30	4/17/31	25	0	0	0	4/17/31	+ 1/50
11	Male	4/15/30 to 6/30/30	2/ 8/32	23	2	0	0	2/ 8/32	—
12	Male	2–'29 to 4–'29	3/31/32	25	0	0	0	3/31/32	+ 1/25
13	Male	1–'31 to 3–'31	7/ 7/32	25	0	0	0	7/ 7/32	+ 1/25
14	Male	3–'30 to 5–'30	7/ 7/32	25	0	0	0	7/ 7/32	—
15	Male	9–'30 to 12–'30	7/ 7/32	25	0	0	0	7/ 7/32	P 1/25

* Ma. = Marked phagocytosis
Mo. = Moderate phagocytosis
+ = Complete agglutination
S. = Slight phagocytosis
N. = No phagocytosis
P = Incomplete agglutination

marked phagocytic power for Brucella *in vitro*.

Results of the Examination of Specimens of Blood from Bacteriology Laboratory Workers. In Table IV are presented the results of the opsono-cytophagic and agglutination test in three groups of laboratory workers; namely, those who have been working with infective material for several years, those who have never knowingly handled infective materials, and a group before and after working with infective materials. Cases No. 1 and 2 represent the latter named group. The blood of these two individuals showed no phagocytic activity for Brucella before working with infective materials or infected animals. At some period within four months after beginning their laboratory work, both were infected with Brucella, as indicated by the results of the blood examinations. There was no clinical evidence of the disease in either case.

Those that have never knowingly worked with infective materials or infected animals are Nos. 6, 10, 12, 18, 19, and 20. The remainder of the group are known to have worked with cultures of the organism or infected animals. The blood of each of the latter, twelve in all, with the exception of one, shows a very marked phagocytic activity for Brucella.

In Table V are presented data on 17 packing house employees, to support the contention that those who are exposed constantly to Brucella infective materials or to Brucella infected animals will sooner or later become infected. The blood of these men was examined on November 11, 1931, with negative results to both the agglutination and opsono-cytophagic tests. One of the men in this particular group, engaged in the manufacture of sausages, developed clinical undulant fever in June, 1932. An examination of the blood of each, including the one, No. 17, who was showing symptoms typical of the disease on July 22, 1932, revealed valuable information pertaining to Brucella infection and immunity. The results of the agglutination test show that eleven had been exposed to infection; that is, the organism had passed beyond the epithelial barrier of the skin or mucous membranes. The opsono-

TABLE IV

OPSONO-CYTOPHAGIC POWER OF BLOOD OF LABORATORY WORKERS—NO HISTORY OF DISEASE

Case No.	Activity of Cells — Number — Date	Ma.	Mo.	S.	N.*	Agglutination Test — Date	Titer	History
1	11/28/30	0	0	0	25	11/28/30	—	Veterinary student. 12/30
	4/30/31	19	2	4	0	4/30/31	+ 1/25	began testing blood specimens for Bang's disease
2	2/ 2/31	0	0	0	25	2/ 2/31	—	Graduate student. 10/31
	6/ 1/32	21	3	1	0	6/ 1/32	+ 1/50	began study of bovine mastitis
3	4/17/31	17	4	3	1	4/17/31	—	Veterinarian. Works with Bang's disease
4	10/ 7/30	25	0	0	0	10/ 7/30	+1/50	Has been in veterinary practice
5	3/31/32	11	8	6	0	3/31/32	+ 1/25	Dairy bacteriologist
6	2/ 2/31	0	0	0	25	2/ 2/31	—	Bacteriologist — never worked with infective material
7	2/ 4/32	25	0	0	0	2/ 4/32	—	Bacteriologist — worked with infective material 15 years ago
8	4/17/31	22	2	1	0	4/17/31	+ 1/50	Veterinarian. Works with infective material
9	12/31/31	25	0	0	0	12/31/31	—	Worked with infective
	1/14/31	25	0	0	0	1/14/31	—	material and cultures for
	9/10/31	25	0	0	0	9/10/31	—	17 years
	6/15/32	25	0	0	0	6/15/32	—	
10	11/14/30	0	0	0	25	11/14/30	—	Graduate student in bacteriology
11	9/25/30	25	0	0	0	9/25/30	—	Bacteriologist — works
	4/29/31	25	0	0	0	4/29/31	—	with infective material
	11/ 9/31	22	2	1	0	11/ 9/31	—	
	3/31/32	25	0	0	0	3/31/32	—	
12	2/ 2/31	0	0	2	23	2/ 2/31	—	Bacteriologist — never worked with infective material
13	9/25/30	25	0	0	0	9/25/30	+ 1/25	Veterinary bacteriologist.
	2/ 2/31	25	0	0	0	2/ 2/31	—	Works with infected cattle
14	4/17/31	25	0	0	0	4/17/31	—	Bacteriologist — works with infective material
15	4/29/31	0	0	1	24	4/29/31	—	Bacteriologist
16	4/17/31	22	1	2	0	4/17/31	—	Cares for infected experimental animals
17	3/31/32	17	6	2	0	3/31/32	—	Washes glassware containing cultures
18	5/11/32	0	0	0	25	5/11/32	—	Laboratory assistant — never worked with infective material
19	5/11/32	0	0	0	25	5/11/32	—	Laboratory assistant — never worked with infective material
20	5/11/32	0	0	0	25	5/11/32	—	Laboratory assistant — never worked with infective material

* See footnote to Table III.

TABLE V

OPSONO-CYTOPHAGIC POWER OF BLOOD OF A GROUP OF PACKING HOUSE EMPLOYEES BEFORE AND AFTER EXPOSURE TO BRUCELLA

Number of Employee	Examinations 11/12/31 Agglutination Titer	Activity of Cells Number Ma.	Mo.	S.	N.*	Examinations 7/28/32 Agglutination Titer	Activity of Cells Number Ma.	Mo.	S.	N.*	Clinical Evidence of Infection
1	Neg.	All cells neg.				+ 1/25	22	2	1	0	No
2	"	"	"	"		+ 1/500	4	4	17	0	Yes
3	"	"	"	"		Neg.	23	2	0	0	No
4	"	"	"	"		+ 1/100	18	7	0	0	No
5	"	"	"	"		Neg.	23	2	0	0	No
6	"	"	"	"		Neg.	0	0	0	25	No.
7	"	"	"	"		Neg.	0	0	6	19	No
8	"	"	"	"		+ 1/500	6	11	7	1	Yes
9	"	"	"	"		+ 1/500	0	3	8	14	Yes
10	"	"	"	"		+ 1/50	24	1	0	0	No
11	"	"	"	"		+ 1/500	2	11	9	3	Yes
12	"	"	"	"		+ 1/500	None made				Yes
13	"	"	"	"		Neg.	25	0	0	0	No
14	"	"	"	"		+ 1/50	22	3	0	0	No
15	"	"	"	"		Neg.	0	0	2	23	No
16	"	"	"	"		+ 1/500	None made				No
17	"	"	"	"		+ 1/500	0	16	9	0	Yes

* Ma. = Marked phagocytosis
Mo. = Moderate phagocytosis
S. = Slight phagocytosis
N. = No phagocytosis

cytophagic test was conducted on all except two. The results of this test showed that all those reacting to the agglutination test and two others that were negative had been exposed to infection. The blood of those, Nos. 2, 8, 9, 11, and 17, which were showing symptoms of the disease, had low phagocytic power for Brucella. The phagocytic power of the cells was either marked or negative in those showing no symptoms of the disease. *Br. suis* was isolated from the blood of No. 11.

The Results of the Examination of Blood Specimens from Large Groups of Individuals. The groups in question were veterinarians, packing house employees, college students enrolled in bacteriology courses, hospital patients and inmates of a State Prison.

The gross results of the opsono-cytophagic test and agglutination test for Brucella are presented in Table VI. Most of the 20 veterinarians examined had been engaged in cattle practice. The opsono-cytophagic power of the blood from 19 was very marked for Brucella. None gave a history of having clinical symptoms characteristic of undulant fever. Many of them, however, report the appearance of an erythema on their arms after removing retained placentas from aborting cows. This sign indicates hypersensitiveness to Brucella. The skin test is always positive in such cases.

Blood specimens were taken from 176 men and women in three packing houses and one stock yard in Michigan. Most of the men were engaged in work which necessitated the handling of fresh pork or beef. The women were employed in wrapping cured bacon for the market. The stock yard employees came in contact with live animals only. The results of the opsono-cytophagic test alone indicate that 40, or 22.7 per cent, of the employees have at some period in the past been infected with Brucella. Of the total examined, three were showing clinical symptoms of

TABLE VI

OPSONO-CYTOPHAGIC POWER OF BLOOD OF GROUPS OF INDIVIDUALS

Group	Number Examined	Date of List	Opsono-Cytophagic Test			Agglutination Test	Estimated Per Cent Exposed to Brucella Infection
			Number Showing				
			All Cells Marked	Few Cells Slight	All Cells Negative		
Veterinarians	20	6/20/31	19	0	1	Titers, varied from negative to + 1/500	95
Packing House Employees	176	11/12/31	40	47	89	Titers, varied from negative to + 1/500	22.7
College Students	29	5/10/31	5	9	15	Titers, negative to incomplete 1/25	17.2
Hospital Patients	240	During 1931–32	30	45	165	Titers, varied from negative to + 1/50	12.0
Men in State Prison	133	7/22/32	14	26	97	Titers, all negative except one + 1/500	10.5

undulant fever at the time the blood specimens were collected.

The 29 college students were in two separate groups, one of which was examined about one year after the other. Of the total number examined, the blood of 5, or 17.2 per cent, showed the degree of phagocytosis observed in those who have at one time been infected with Brucella.

The hospital patients from whom blood specimens were examined constituted a rather miscellaneous group of both males and females. They might be grouped as cases of infectious and organic disease, injuries, and blood donors from whom blood is taken for transfusion. Of the total number examined, the blood of 30, or 12 per cent, showed the degree of phagocytosis observed in those who have at one time been infected with Brucella.

TABLE VII

A PROPOSED SYSTEM FOR THE DIAGNOSIS OF UNDULANT FEVER ACCORDING TO RESULTS OF THE AGGLUTINATION, ALLERGIC AND OPSONO-CYTOPHAGIC TESTS

Agglutination Test	*Allergic Skin Test*	*Opsonophagic Power of Blood*	*Status Toward Brucella*
—	—	Cells negative to 20 per cent slight	Susceptible
—	+	Cells negative to 40 per cent marked	Infected
—	+	Cells 60 to 100 per cent marked	Immune
+	+	Cells 60 to 100 per cent marked	Immune
+	+	Cells negative to 40 per cent marked	Infected

The prison inmates examined were of two groups, namely, kitchen personnel and patients in the tuberculosis hospital. The latter group may be divided into diagnosed cases and suspects. Of those examined, the blood of 14 or 10.5 per cent, showed a marked degree of phagocytosis for Brucella. These men came from all walks of life and should represent a cross section of what one would expect to find from an examination of the blood of the general population. Patients examined in the hospitals and students also represent a cross section of the general population.

DISCUSSION

We present data on an opsonocytophagic study of the whole citrated blood of humans with respect to Brucella infections. A technic for testing the opsono-phagocytic power of the whole blood and a reagent and procedure for making a satisfactory allergic skin test are described. The two tests should be made simultaneously in determining the status of an individual as respects Brucella infection. The data have furnished a basis for measuring susceptibility, infection and immunity to Brucella infection.

The advantage of using whole blood in such studies has been pointed out by Shattock and Dudgeon,[7] Hektoen [8] and many others. The addition of sodium citrate to the blood serves a twofold purpose, namely, to prevent clotting and partially or totally to reduce the opsonic property of the serum in order to ascertain variations in the phagocytic power of the blood.

The basis for the assertion that the measurement *in vitro* of the opsonocytophagic power of whole citrate blood of humans in conjunction with the determination of skin allergy for Brucella, will determine susceptibility and immunity to, as well as infection with Brucella, rests upon the data which we have gathered. Although our data with respect to phagocytic activity of the blood in Brucella infection in man is new, it might be said here that many investigators have collected similar data from the study of other infectious diseases of man and animals. The interpretations which they have given to their results differ somewhat from those placed on our own. For example, a continuous high phagocytic power of the blood for an organism has been interpreted as meaning a "carrier state," by certain workers. Ledingham,[9] Gaehtgens,[10] Hamilton,[11] and others have observed that sera of typhoid carriers invariably show a high opsonic index when compared with the normal individual. Such findings have been considered useful in detecting the typhoid carrier. If the high phagocytic power of the blood seen in those who recover from undulant fever as well as many other individuals who give no history of the clinical manifestations of the disease, is taken as evidence of a carrier state as it is in typhoid, then there is a large group of individuals in this country who are constantly carrying Brucella in some part of their body. The data that we have accumulated on blood specimens from humans do not indicate that a continuous high phagocytosis for Brucella signifies a carrier state.

The observations which we have made over a period of years on the value of the intradermal test for detecting Brucella infection in humans convince us that a positive reaction does not necessarily mean active infection. A positive reaction signifies sensitization to Brucella. If a positive skin reaction is obtained in doubtful cases of undulant fever, the positive reaction does not have specific significance until a determination of the opsono-cytophagic power of the whole blood is made. The latter test should be made at the same time or before the skin test is performed.

In order that the interpretation of the combined agglutination, opsono-cytophagic and allergic tests may be clarified as respects the status of a given individual toward Brucella infection, we are proposing a system of diagnosis according to the combined results of the three tests. The proposed system is arranged in Table VII.

In any study which concerns the phenomenon of phagocytosis there always appear many problems and questions that need solving and answering. We have studied at considerable length the factors involved in bringing about the phagocytosis of Brucella in human blood and blood from other species of animals as well. We have also made some very interesting observations on the opsono-cytophagic power of the cord blood from infants and blood from new born calves before and after the ingestion of colostrum. These studies together with a considerable number of other observations will appear in a forthcoming paper.

SUMMARY

The studies which we have conducted on citrated blood of humans who were known to have had undulant fever in past years and shortly after recovery, who are actively infected, or who have no history of the disease, show that the *in vitro* activity of the polymorphonuclear cells in whole citrate blood for Brucella is an expression of immunity to Brucella and an indication of the progress toward recovery in active infection. The absence of or a low phagocytic activity obtained in conjunction with a negative allergic skin test is evidence of susceptibility to Brucella infection. Infection in an individual is indicated by a positive allergic skin test obtained with Brucella nucleo-protein in conjunction with negative or low opsono-cytophagic activity of the whole citrated blood for Brucella.

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NOTE: Journal Article Number 125 (N.S.) from the Michigan State Experiment Station. This study was partly financed by a grant from the Abortion Committee of the National Research Council and the Commonwealth Fund.

Toxicity of Organic Fluorides*

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THIS paper presents a résumé of the toxicological properties of two compounds — namely, dichlorodifluoromethane and dichlorotetrafluoroethane— that have been developed in the course of a search for safe refrigerants.[1] The toxicological investigation was made by the Bureau of Mines with the coöperation of the Frigidaire Corporation, the Bureau of Mines interest being inherent in the problem of safety in conditioning the air of mines where the high temperature and humidity present an unhealthy environment for workmen and in some cases are an impediment if not a barrier to mining operations.

At the present time there is much interest in and endeavor toward increasing health and safety in domestic and industrial refrigeration. The effort is aimed not only at betterment of present appliances and the solution of present problems but also at the solution of problems which are anticipated in the extension of refrigeration, particularly for conditioning the air of homes, public buildings, and working places. In some instances the endeavor is directed toward safer means for using a product that is potentially or has been in fact a source of trouble, as: better mechanical construction; means for apprising persons of leakage; using refrigerants that permit lower operating pressures, possibly even below atmospheric pressure; limiting the quantities of refrigerating media used and hence the potential magnitude of exposure of persons; and regulations pertinent to the installation of the devices. In other instances the endeavor has been not only to prevent exposure but also to develop refrigerating media of a safer nature.

PHYSICAL AND CHEMICAL PROPERTIES [2]

Dichlorodifluoromethane [2] (CCl_2F_2) at room temperatures and pressures is a heavy, colorless gas that possesses a chloroform-carbon-tetrachloride-like odor.* The boiling point is —29.8° C.; density of liquid, 1.35 gm. per c.c. at 13.8° C.; specific gravity of gas (air = 1), approximately 4.2; vapor pressure in atmospheres, 3.045, 5.592, and 11.99 at 0°, 20°, and 50° C., respectively. It is non-flammable, non-corrosive, and neutral. Solubility is estimated as 0.03 gm. in 100 gm. of water. The operating pressures of refrigerating devices using this compound would be in the general range of those for sulphur dioxide and methyl chloride.

Dichlorotetrafluoroethane[2] ($C_2Cl_2F_4$) at room temperatures is a heavy, colorless gas that possesses a sweet chloroform-like odor.* The boiling point is 3.6° C.; density 1.4 gm. per c.c. at 15° C.; specific gravity of gas (air = 1), approximately 5.9. It is non-flammable, non-corrosive, and neutral. Solubility is estimated as 0.1 gm.

* Read before the Industrial Hygiene Section of the American Public Health Association at the Sixty-first Annual Meeting in Washington, D. C., October 27, 1932.

* As this work was performed while these products were in the semi-commercial stage of production, the products may have contained traces of impurities which contributed to the odor.

in 100 gm. of water. The physical properties of this compound permit its use in refrigerating appliances designed for operation at nearly atmospheric pressure, thereby minimizing the possibility of leakage.

EXPERIMENTAL PROCEDURE AND APPARATUS

The reader is referred to progress reports on the toxicity of these compounds [3, 4] for a detailed description of the test equipment and procedure. It may be briefly stated here that the experiments were conducted under carefully controlled conditions. The concentration of vapor was recorded continuously during all experiments by means of a thermal conductivity gas-analysis apparatus, and the oxygen and carbon dioxide content was ascertained by volumetric gas analysis procedures. Control animals were simultaneously exposed to identical conditions except that the air lacked the vapor.

RESPONSE OF ANIMALS TO DICHLORODIFLUOROMETHANE

Repeated Exposure of 7 to 8 Hours Daily to 20 Per cent CCl_2F_2 in Air—Dogs and monkeys * were exposed to air containing 20 per cent by volume of CCl_2F_2 for 7 to 8 hours daily on five days, and for 4 hours on the sixth day of each week during a 12-week period. This exposure produced mild to moderate to marked generalized tremor in dogs, and mild to moderate generalized tremor in monkeys. The tremor was recurring and cyclic, each cycle ranging from a fine tremor when the animal was quiet to a marked coarse tremor, often convulsive, when there was attempted activity. When the animals, particularly the dogs, attempted to walk, they acted very much like persons suffering from alcoholic ataxia. They reacted to light and stimuli, and did not become unconscious. The maximum severity of symptoms was reached in the first 10 to 20 minutes of an 8-hour exposure. The symptoms practically disappeared in 1 minute and completely disappeared in 10 minutes after removal from the test environment. In most instances the animals ate food offered to them during exposure and always had good appetites in 5 to 10 minutes following a daily exposure period. A tolerance was developed with successive daily exposures. This was manifested by a marked decrease in severity of the symptoms. No fatalities occurred.

The number of red blood cells and the hemoglobin content increased slightly during the first two or three weeks of the series of exposures but thereafter was normal and similar to control animals. There was also a slight increase in the polymorphonuclear neutrophils with a slight decrease in lymphocytes.

Autopsies performed on all animals revealed no gross pathology attributable to the exposure to dichlorodifluoromethane.

The persons that performed these experiments were momentarily exposed on many occasions to the experimental environment. It produced distinct eye irritation and immediate symptoms of vertigo. These symptoms disappeared in a minute or two after exposure. The character of the atmospheres is such that persons would not voluntarily tolerate it.

Continuous Exposure (24 Hours Daily) to 20 Per Cent CCl_2F_2 in Air—Monkeys exhibited signs of irritation of the eyes and slight incoördination during the first 9 to 14 hours and were, in general, sluggish and drowsy with incoördination after 18 hours, though at times they became very alert and active. The periods of activity were followed

* Guinea pigs were also used in this study, but owing to the desirability of condensing this paper the results are confined to those obtained on dogs and monkeys. The work with guinea pigs has been described in previous publications.[3, 4]

by periods of marked sluggishness and drowsiness. This condition prevailed without occurrence of unconsciousness during continuous exposure periods up to 121 hours and 24 minutes. No deaths occurred during or following these exposures. Gross autopsy findings were slight congestion, particularly in the lungs, and appearance of slight fatty degeneration of the liver.

A dog exhibited signs of irritation of the eyes, generalized tremor and marked incoördination in a few minutes, and incoördination to the point of falling after an hour and 20 minute exposure. Tremors increased in severity during the following three hours, and at times there was a pronounced jerking of the head. Also during this time unsuccessful attempts were made to stand. However, following these observations the animal began to show tolerance; the tremors were less severe, the dog was able to stand, and he ate food. The remainder of a continuous 121 hour and 24 minute exposure was characterized by signs of weakness and somnolence with periods of apparent normalcy. After termination of exposure the symptoms abated in a few minutes. This animal was observed for 28 days following termination of exposure and then killed for autopsy while in an apparently healthy condition. Gross autopsy findings were signs of a previous irritation of the lungs and the liver was pale; otherwise the organs appeared normal.

EXPERIMENTS WITH DICHLOROTETRAFLUOROETHANE ($C_2Cl_2F_4$)

The experiments with dichlorotetrafluoroethane ($C_2Cl_2F_4$) were performed in the same apparatus and according to the same technic as those with dichlorodifluoromethane.

Exposure to 20 Per Cent $C_2Cl_2F_4$ in Air—In general the symptoms were very similar to those produced by dichlorodifluoromethane. Exposure of dogs to 20 per cent vapor caused immediate and continued marked generalized tremors and recurring convulsions with periods of relaxation and exhaustion. Recovery was rapid and complete after a single 8-hour period; death occurred in seven days following a single exposure of 16 hours, and in three days following a single exposure of 24 hours.

Repeated exposures of eight hours daily produced immediate marked generalized tremors and convulsions, and death after 3 to 4 daily periods.

The number of red blood cells, hemoglobin and the younger forms of polymorphonuclear leucocytes invariably increased in the general order of the severity of the exposure. There was usually a slight to moderate decrease in platelets. Other blood findings were of no particular significance. A tendency toward a slight increase in red blood cells, hemoglobin and the younger forms of polymorphonuclear leucocytes was also noted in the control dogs, but this change was slight in comparison to that observed in the exposed animals. The changes observed in the blood counts of the exposed dogs, although possibly influenced by the decrease in oxygen, caused by dilution of the air with the dichlorotetrafluoroethane vapor, were undoubtedly due to some extent to $C_2Cl_2F_4$.

Congestion throughout all of the organs was the most definite gross pathological finding in all dogs that died. This was particularly noted in the lungs with areas of hemorrhage, and in the gastrointestinal tract.

Exposure to Approximately 15 Per Cent $C_2Cl_2F_4$ in Air—In view of the fact that the response to 20 per cent $C_2Cl_2F_4$ was more severe than the response to a similar volume concentration of CCl_2F_2, the concentration used for succeeding experiments was 14.16 to 15 per cent vapor by volume. On a

weight basis a 14.16 volume concentration of $C_2Cl_2F_4$ is equivalent to a 20.0 per cent by volume concentration of CCl_2F_2. Also the fluorine present (by weight) is equal in these comparative volume concentrations.

Exposure to 14.16 or 15 per cent vapor in air caused moderate to marked incoördination with generalized tremors in dogs, and occasional convulsions, the symptoms again being similar to those previously described for CCl_2F_2. After three to five consecutive 8-hour daily exposures to 14.16 per cent a tolerance gradually developed, convulsions disappeared and tremors became finer or disappeared entirely. There was a slight loss of appetite and weight during the first five days of exposure but this was regained with succeeding exposures and was maintained. No deaths occurred during 21 consecutive exposures or during a 15- and 17-day post-exposure observation period. Exposures to 15 per cent vapor in air for a single period of 16 or 24 hours caused temporary loss of appetite but no deleterious effects of a permanent nature were observed.

Eight-hour exposures for 21 consecutive days produced a slight gradual increase in hemoglobin and red blood cells. This returned to normal in 15 to 17 days after exposure. The younger forms of polymorphonuclear leucocytes increased during the first week of exposure but returned to normal with succeeding exposures. There was a slight decrease in platelets in one animal during the first part of the series but they returned to a normal number with succeeding exposures; the other dog showed no change in platelets.

No gross pathology was found in dogs repeatedly exposed 8 hours daily for 21 consecutive days; a slight congestion of the gastrointestinal tract was found in a dog continuously exposed for 24 hours to 15 per cent of gas, and a gastroenteritis in a dog continuously exposed for 16 hours to 15 per cent. This was at first thought to be due possibly to secretion of dichlorotetrafluoroethane into the gastrointestinal tract, but on further consideration it appeared that the recurring convulsions that accompanied exposure were a more logical cause.

DISCUSSION OF TOXICITY OF ORGANIC FLUORIDES IN RELATION TO FUNDAMENTAL TOXICOLOGY

Aside from the primary interest of enhancing safety in refrigeration and air conditioning, these organic fluorides are very interesting from the viewpoint of fundamental toxicology. On the basis of former knowledge of the physiological response to volatile halogen derivatives of aliphatic hydrocarbons, as methyl chloride (CH_3Cl), chloroform ($CHCl_3$), carbon tetrachloride (CCl_4), and tetrachloroethane ($C_2H_2Cl_4$), and the comparative toxicity of inorganic chlorides and fluorides, it would generally be expected that the substitution of fluorine atoms for hydrogen or in part for chlorine atoms in the molecule would increase the toxicity. However, a comparison of the observed response to dichlorodifluoromethane (CCl_2F_2) and dichlorotetrafluoroethane ($C_2Cl_2F_4$) with response to the previously mentioned compounds will show that the response to these fluorine-containing derivatives on the basis of concentrations in the air by volume is phenomenally less than would be expected. The effective concentrations are of an entirely different magnitude, being roughly 50 to 100 times those of the previously mentioned group.

The wide difference in toxicity between these aliphatic fluoro-chloro compounds and aliphatic chloro compounds brings to attention the need for more fundamental information on these subjects and points out the potential value of such information to the selection and development of safer chemical com-

modities. An obvious suggestion is the development of a non-flammable gaseous anesthetic with a low toxicity.

SUMMARY

The results of exposure of dogs and monkeys to dichlorodifluoromethane and dichlorotetrafluoroethane vapor in air shows that the toxicity of these chemicals is very low.

Concentrations of 20 per cent CCl_2F_2 by volume produce marked objective symptoms during exposure but they disappear very rapidly after termination of exposure, and no distinct harm is evident after many repeated exposures of eight hours daily. Exposure to 20 per cent vapor in air continuously for 121 hours also produced marked symptoms but did not cause unconsciousness or death.

Concentrations of 14 to 15 per cent $C_2Cl_2F_4$ by volume produce marked objective symptoms during exposure, but they disappear very rapidly after termination of exposure. No distinct harm is evident after as many as 21 consecutive exposures of eight hours daily. Twenty per cent concentrations or longer exposures daily produce evidence of harm. It is evident that on the basis of equal concentrations in air $C_2Cl_2F_4$ is distinctly more harmful than CCl_2F_2 but is of the same low order of relative toxicity when comparison is made with gases that present public or industrial health hazards.

The odor intensity and irritative properties of both CCl_2F_2 and $C_2Cl_2F_4$ are high enough to give distinct warning of their presence in concentrations far below those that produce death.

It may be added that the experiments described in this report were performed with a supply of material produced by a semi-commercial plant. It is very possible that small amounts of other halogenated hydrocarbons may have been present. It is known [5] that certain other chloro-fluoro hydrocarbon derivatives have a higher order of toxicity than CCl_2F_2 and $C_2Cl_2F_4$, and considering the high concentrations of CCl_2F_2 and $C_2Cl_2F_4$ used in the experiments, the presence of fractional percentages of other compounds could have been responsible for a considerable part of the observed response.

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The Incidence of Xerophthalmia and Night-Blindness in the United States—A Gauge of Vitamin A Deficiency

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ALTHOUGH we have acquired a considerable fund of knowledge in regard to the vitamins and collected satisfactory data as to their distribution among the various foods, the question is still mooted as to whether there is a sufficiency of these essential food factors in the American dietary. This question is particularly acute in regard to the adequacy of vitamin A in the diet of both children and adults. In view of the importance of this subject and what we believe to be an exceptional opportunity for its elucidation, we decided to carry out a survey of the clinical evidence of early vitamin A deficiency in cities of the various sections of the country.

As is well known, a lack of vitamin A, which has unfortunately been given the titles "the ophthalmic vitamin," "the growth vitamin" or "the anti-infective vitamin," is manifested in young children and infants by a pathologic lesion of the eye which, according to the degree of severity, is designated as xerosis or xerophthalmia. In adults, we are exceptionally fortunate in being able to recognize the deficiency of this vitamin by the occurrence of a disturbance which is functional rather than organic, namely, night-blindedness or nyctalopia. This defect of vision is evidenced by inability to see at night, due to the failure of dark adaptation of the retina; the affected person may simply note a slight dimness of vision or the lack of vision may be extreme so that he is unable to find his way about even in moderate darkness. In order to ascertain the incidence of these two deficiency manifestations a questionnaire was sent to some 50 leading ophthalmologists in the United States, based on membership in the American Ophthalmological Society, inquiring how often they had encountered moderate or severe cases of xerophthalmia or cases of night-blindness in the course of their private practices. Information was also asked in regard to whether cases of this kind had become more frequent in the course of the current economic depression. Forty-one eye specialists have been kind enough to answer our queries and it is on the basis of such information that we have prepared this short report.

Of the 41 physicians, distributed from the east to the west coast and from Maine to Florida, 11 had not met with cases of xerophthalmia. Most reported having seen but 1 or 2 cases and stated that they regarded the disease as rare. Only 1 is of the opinion that "mild cases are not very rare," adding: "No survey is available at the present time on the incidence of xerophthalmia in this country. As a matter of fact, there are only 12 cases reported in the American literature on this subject. In

RESPONSES OF OPHTHALMOLOGISTS IN REGARD TO INCIDENCE OF XEROPHTHALMIA AND OF NIGHT-BLINDNESS

Observer	Xerophthalmia		Night-Blindness	Effect of Depression	Remarks
	Moderate	Severe			
1	Not very rare	4 (babies)	0	Fewer than ever	
2	Very few	Very few	0	No increase	
3	Few	2	2	No increase	
4	No answer	1	0	No increase	
5	No answer	0	0	No increase	
6	No answer	0	0	No increase	
7	No answer	1	0	No increase	
8	No answer	2	0	No increase	Seen 10 years ago
9	No answer	0	0	No increase	
10	No answer	?	0	No increase	
11	2	1	0	No increase	
12	No answer	1	1	No increase	
13	No answer	2	0	No increase	Both dieted
14	1	No answer	0	No increase	
15	0	0	0	No increase	Formerly frequent
16	No answer	5	No answer	?	Five seen in 15 years. Mild cases frequent (?)
17	0	0	No answer	0	Frequent in China
18	Rare	Rare	0	0	
19	0	0	0	0	
20	0	0	0	0	
21	0	0	0	0	
22	?	0	0	0	
23	0	0	0	0	
24	0	0	0	0	
25	No answer	No answer	0	0	Five cases in 30 years
26	No answer	2 or 3	0	0	
27	No answer	2	No answer	No answer	Two in 5 years
28	No answer	4	No answer	No answer	Four in 5 years
29	No answer	1	No answer	No answer	
30	No answer	0	No answer	No answer	Large number in negroes years ago
31	No answer	0	No answer	No answer	Many cases years ago
32	0	0	1	0	
33	0	0	0	0	
34	0	0	0	0	
35	0	0	0	0	Some years ago
36	Rare	Rare	0	0	
37	Yes	No	0	?	
38	No	10	0	0	
39	No	Rare	No answer	No answer	
40	No answer	3	3	No answer	Three in 2 years
41	No	2	0	0	Two in 1 year

our community my attention has been called to 5 cases of xerophthalmia in the last 15 years." This was the greatest number anyone had observed. One wrote, "I have had only 1 case in my practice. This man ate practically

nothing but potatoes." References to a marked restriction of the dietary due to some gastrointestinal disorder or to faddism, were not infrequent. All in all, there is unanimity as to the infrequency of xerophthalmia.

Although cases of xerophthalmia had been reported from time to time, it was not until the period of the World War that this disorder was thrust upon our attention. During the war Denmark exported most of her butter and fed her infants and young children milk which had been skimmed. Before long a disease of the eyes developed among the young. In the 86 cases reported by Bloch,[1] 47 developed this disorder during the first year of life and 20 of these during the first six months. Of Blegvad's[2] 430 cases of keratomalacia, 368 occurred during the first year, the majority in the second quarter; 62 were seen during the second year of life. These figures indicate the marked susceptibility of infants to this disease and, incidentally, their exceptionally high requirement of this vitamin. Among a group of children given whole milk, Bloch found that no instance of eye disease developed. In general, this has been the experience where xerophthalmia has been noted; in fact, no one has reported its development on an average dietary in a normal child. In almost every instance the diet has been exceptionally and preëminently defective. For example, Pillat,[3] who has contributed so greatly to our knowledge of this subject, and has reported its frequency in China among the soldiers, states that they ate "only rice, corn, millet, very little flour; once a month a small quantity of meat and no green vegetables whatsoever. Almost no fat was used for cooking." A similar comment has been made in a recent account of xerosis in Tientsin where the diet of the infants consisted of rice water or condensed milk, and that of the adults of bread, rice or vegetable water and salted cabbage or turnips.[4] Probably the condensed milk was given greatly diluted. Aykroyd,[5] who has published an interesting account of the development of xerophthalmia among the fishermen in Labrador, states that their diet consisted mainly of white bread, molasses, fresh cod fish, salt meat, beans, peas, some potatoes, but no milk, butter, eggs or green vegetables.

In regard to the effect of the economic depression on the incidence of xerophthalmia, the answers, without exception, were to the effect that this condition had not brought about a noticeable increase. Gifford, of Chicago, who has reported cases of xerophthalmia, wrote: "I have really seen very little of this disorder in spite of the depression and I have been on the watch for it." Bedell, of Albany, who has also contributed to the literature on this subject, answered as follows: "Strangely enough I am seeing fewer of these cases at this time than ever, so that the depression has not had any effect in increasing their incidence." This evidence from those who would be expected to see cases of this description is substantiated by the fact that in the Quarterly Index of medical literature for the latter half of 1932, no instance of xerophthalmia is reported from the United States. Although references to night-blindness have been recorded in previous volumes of the Quarterly Index, this disorder is entirely omitted from the latest volume.

The other clinical evidence of a deficiency of vitamin A, night-blindness, can be elicited only in older children or in adults. This sign gains added significance from the fact that it is functional, unaccompanied by ophthalmoscopic evidence, and that it is quickly, almost miraculously, remedied when the dietary is fortified with vitamin A. For example, 1 or 2 teaspoonfuls of cod liver oil will often cure

the condition from a functional standpoint within 24–48 hours. In this symptom we possess the most delicate of all indicators for vitamin deficiency; in relation to no similar disorder have we as yet a sign or test which is unaccompanied by pathologic change. Among the 41 answers only 8 cases of night-blindness were reported by the various specialists, 1 writing that he had met with 3 instances in the past 2 years. That night-blindness is due to a lack of vitamin A was proved in 1925 by the interesting experiments of Fridericia and Holm,[6] who showed that the visual purple of the retina, after exposure to strong sunlight, was particularly slow to regenerate in rats which had been on a diet devoid of vitamin A. The biologic experiments of Yudkin and his coworkers[7] indicate that the retina is exceedingly rich in vitamin A. Indeed Yudkin found, according to a later report,[8] that the retina of the hog is richer in vitamin A than is butter-fat, although the choroidal tissue is almost devoid of it. It may be stated without fear of controversy, that night-blindness is a rare disorder in the United States and that most of the reports of this disturbance emanate from countries where there has been famine or a marked deficiency of food. Without entering into detail, it may be stated that a review of those cases which have been reported from the United States and Europe shows that, as in the case of xerophthalmia, they have been occasioned by either a notable defect in diet due to idiosyncrasy or by some condition which induced a lack of utilization of the food. Drunkards are especially susceptible. A report of the Copenhagen Poor Law Institution states that 45 per cent of the 312 inmates were found to suffer from night-blindness and that this disorder followed the consumption of corn brandy.[9]

CONCLUSION

A formal inquiry carried out among the leading eye specialists throughout the United States may be summarized by the statement that xerophthalmia is of rare occurrence in this country and that night-blindness is even more exceptional. Furthermore, it is the consensus of opinion that there is no indication whatsoever that either of these diseases has increased in frequency during the economic depression. As both of these disorders are the result of a deficiency of vitamin A, it would seem as if a lack of this vitamin among the child and adult populations is extremely uncommon. This conclusion is all the more warranted in view of the fact that night-blindness is a very early and purely subjective symptom of vitamin A deficiency, occurring before any ophthalmoscopic evidence or microscopic lesion can be noted in the retina.

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A Modified Quevenne Lactometer for the Public Health Laboratory Control of Market Milk*

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THE Dairy and Milk Laws of the State of California require that at least two street samples of market milk be collected every month from delivery wagons, these samples to be routinely subjected to the standard plate count, to a test for butter fat, for the amount of sediment and for the solids not fat.

Although the Standard Methods of the A.P.H.A. and A.O.A.C. are the official methods by law, for practical reasons the Babcock test and the lactometer are used throughout the State for the fat determinations and for computing the solids not fat. Actual extraction and gravimetric determinations cannot be conducted in the average laboratory because of the time involved in such determinations. Where milk work alone is handled by a laboratory, the Majonnier and chemical analysis is possible; but milk work in California public health laboratories constitutes only one of many widely variegated procedures, all of which is conducted frequently by but one or two State authorized bacteriologists. Most of such laboratories do not employ a specialist in chemistry.

Accordingly, the lactometer has carried a great deal of responsibility in such work and because accuracy in these instruments varies with the extent of range that the stem includes, it was true that the same distributor's milk tested on the same day in two or more neighboring health department laboratories did not give comparable findings as regarded solids not fat. This led to dissatisfaction on the part of dairymen and others, and the laboratory was blamed for inaccuracy of technic when, as a matter of fact, physical equipment that was not standardized for accuracy was to blame.

A state law considers an 8.7 per cent solids not fat as a full score milk; whereas a milk below 8.5 per cent solids not fat is illegal. The Los Angeles County Health Department Laboratories was authorized by the County Health Officer (Dr. J. L. Pomeroy) to investigate existing conditions that appeared to be working certain injustices to the dairy industry.

It was soon established that a variety of instruments were in use throughout the state, the length ranging from 6 to 9, to 10 or 12 inches. The length of graduation between 14 to 42 Quevenne degrees varied from 1½ to 4¼ inches. Some instruments contained thermometers as a part of the whole; some were for "pure" milk and skim milk in one instrument. A considerable number of instruments of cheap foreign manufacture were in use.

* Discussed before the California Association of Dairy and Milk Inspectors, at San Bernardino, Calif., on October 9, 1928, and at Oakland, Calif., on October 9, 1929.

These did not have a manufacturer's name on them and seldom checked one against another.

Some instruments were recommended to be read at the *top* of the meniscus while others were to be read at the *surface* of the liquid. Such recommendations were on the slip of paper packed in the instrument—not on the instrument itself. Such a record was soon divorced from the instrument itself so that an operator not knowing the manufacturer's design would proceed as in the usual spindle reading and record the specific gravity as that where the surface of the liquid cut across the stem. This permitted of errors of one full degree or more dependent upon the spacing of the degree graduations on the stem. Since one degree is equivalent to .25 per cent of solids not fat, such an error could throw a fully legal 8.7 per cent milk into an illegal 8.45 per cent solids not fat. Conversely an illegal milk could be thrown into a fully legal milk if the reading was made at the surface of the liquid on a "top of meniscus" standardized lactometer.

The retail price of these various types of lactometers ranged from $1.25 to $5.00. When one considers the relatively high price precision instruments demand, it should be recognized that the cheaper instruments could not possibly be depended upon.

American manufacturers generally devote care in the products they are to sell, and such were certainly much more comparable in the reading of more than one instrument on the same milk than were the cheap "flood" of imported stock. However, it is doubtful that any of them expected that an instrument selling for a relatively low price (compared with laboratory equipment generally) would be absolutely accurate for whole milk, skim milk, and for temperature.

In answer to a written inquiry from us, Ernest Kelly replied:

> I have your letter of the thirteenth regarding the method of reading lactometers. There is a considerable diversity in this practice in various places. I took the matter up with the Bureau of Standards some time ago and found that they read to the top of the meniscus when standardizing lactometers that are sent in to them. This being the case, it is apparent that lactometers which have been standardized by the Bureau of Standards should be read to the top of the meniscus. I do not understand just why lactometers should be standardized in this way. It seems that there should be a good deal of work done to check up this method with specific gravities determined by other methods.
>
> With the ordinary lactometer the difference between the top of the meniscus and the surface of the liquid is approximately one degree. This would make a difference of about .25 per cent in solids not fat as calculated, so that if there is not a standard method of reading the lactometer there would be an unfortunate variation in calculating the solids.
>
> It is obviously impossible to read the lactometer at the exact surface level of the liquid. I have usually read the lactometer at the point where the scale is plainly visible through the meniscus. However, if all lactometers are standardized to the top of the meniscus, that is the place where readings should be made.

A letter from the referee for the Association of Official Agricultural Chemists written by Dr. Robert S. Breed under date of April 26, 1927, said:

> I find on looking up the methods of the A.O.A.C. that they recommend that specific gravities of milk be determined by the use of the pycnometer. The lactometer method is a rough and ready method satisfactory for certain purposes but is not sufficiently accurate to have received the approval of this Association. The Westphal balance method is likewise accurate and perhaps more convenient than the pycnometer.

EXPERIMENTAL WORK

Milk was used rather than standardized solution, in making our comparisons. Pycnometer determinations were used to adopt a standard. Against such readings various lactometers were used for tests upon the same market milk. Eighteen foreign imported lactometers

FIGURE I

This as a whole shows actual comparison in length by inches of the three lactometers worked with extensively.

A is the U. S. Department of Agriculture lactodensimeter.

B is the usual lactometer seen in use by dairy laboratories. It combines temperature, pure milk, and skim milk readings.

C is the "Stone type" lactometer with the short range of specific gravity scale.

D is the Thermometer arrangement showing pencil clip that holds thermometer to jar.

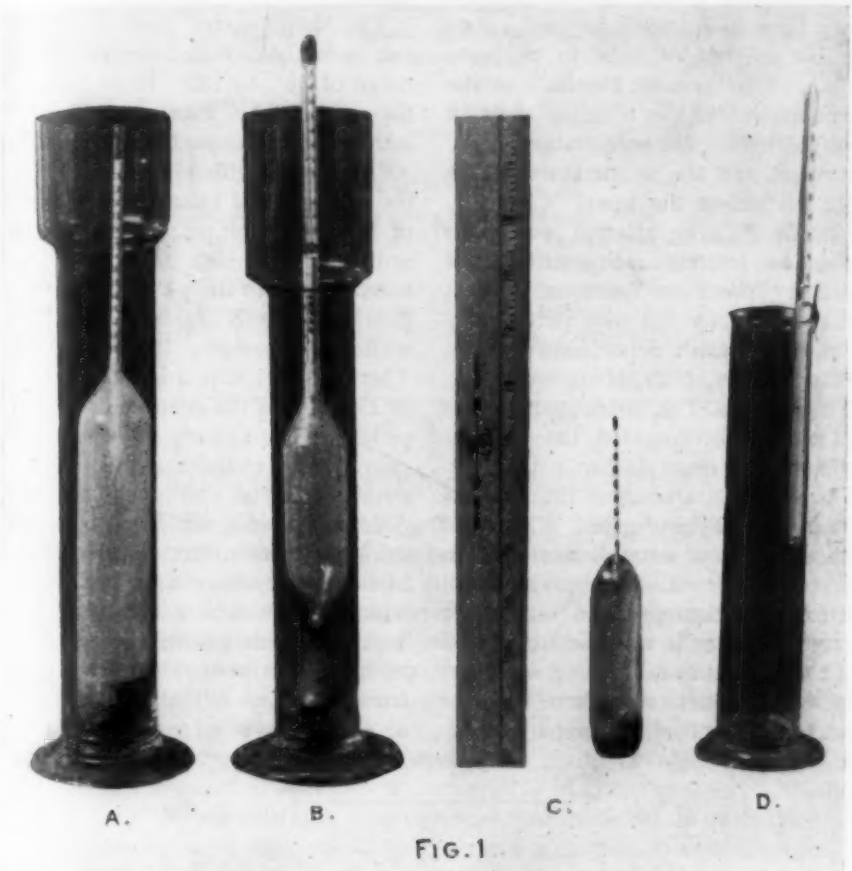

FIG. 1

yielded only three that were accurate enough to use with a certain feeling of confidence; the other fifteen varied from 0.3 to 1.5 degrees at 60° F.

An instrument was purchased of a type from which we selected by gravimetric determinations an accurate "standard" lactometer to use routinely as the control against which we checked many lactometers obtained in the local market and from other laboratories. This was the United States Department of Agriculture lactodensimeter. It has a range from 24 to 37 Quevenne degrees distributed over a scale of 3¼ inch length. Each degree is divided into 1/10's. Thus, each degree is approximately ¼ inch in height and the variation by the reading at the surface of the liquid, or at the top of the

meniscus, by such length scale minimized the inaccuracies of a shorter scale instrument. However, in the control of market milk the actual specific gravity scale in which we are interested includes those just above and just below the perfect scoring and the illegal product. Our main objection to this lactodensimeter is that its size necessitates a large hydrometer jar and a considerable amount of milk to facilitate reading. Furthermore, the bulk of the instrument introduces a factor of delay while waiting for the temperature of the instrument and the temperature of the liquid to become the same.

Late in 1928 an attempt was made by us to interest manufacturers of laboratory precision instruments in a special lactometer designed particularly for routine health department control work. In May, 1929, Hiergesell Bros., of Philadelphia, Pa., submitted a blueprint which incorporated the requirements we had made as being desirable.

The range in Quevenne degrees was reduced to 29–35 degrees. Thus 22 Quevenne degrees were eliminated from the older type of scale. The thermometer was discarded as a part of the instrument, since it was our firm belief that accuracy in but one thing was more possible of attainment than if other factors were introduced into the instrument's construction. This, commercially, has become known throughout the State of California as the "Dr. Stone type" and has been introduced through its own merits as the recommended State lactometer. Coincident with its use, the variations on the same milk in different laboratories practically ceased.

The thermometer used is a "cloud and pour" 4¼ inch immersion, with a range of 36° to 120° F. in two-degree divisions. The total length is 8¾ inches and is designed according to the ASTM specifications. It is fastened to the ungraduated cylinder (used instead of a hydrometer jar) by means of an ordinary pencil clip. This fixing of the thermometer to the jar permits of ready pouring of milk samples in and out without disturbing the thermometer. Thermometer, clip and jar are shown in Figure I at the righthand side of the picture. The cylinder used is a lipped, ungraduated cylinder and is 1⅝ inches outside diameter and is 8¼ inches high. A half-pint milk sample can be tested using this style thermometer and the Stone Lactometer. At present but one manufacturer has coöperated in the making of this instrument but there is nothing to prevent other manufacturers from making it as there are no royalties or patents involved with this design.

Marriage Premiums in Italy

THE National Bureau of Maternal and Child Welfare of Italy has recently begun to give premiums to mothers of illegitimate children who later marry, at the time of their marriage. At the beginning of the present year this policy was extended to all young women intending to marry, and 2,000,000 lire was appropriated for that purpose.

Each premium is to amount to about 200 lire. A list is to be kept of the women receiving these premiums, and during pregnancy and after the birth of a child they will be asked to take advantage of the health centers, day nurseries, free lunch rooms, and other welfare arrangements maintained by the Bureau.—*Maternita ed Infanzia*, Rome, Mar., 1933.

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THE DEPRESSION AND HEALTH

THE effects of the depression on public health have been discussed from various aspects. In our August number we carried a paper in which evidence which had been subjected to careful scrutiny was brought forward by one clinic to show that malnutrition is showing some effects. Those who have lived in the drought section, which was affected by floods only a few years ago, have had some first-hand experience and have been somewhat doubtful as to the evidences of malnutrition due to the depression since many of the cases in which malnutrition undoubtedly existed were proved to have preceded the drought. Indeed, many health officers have remarked on the unusual good health throughout the country and the marked absence of bad effects attributable to the depression. All, however, have been uneasy over the situation and feel confident in predicting that bad effects of greater or less severity will be seen sooner or later. However, we must be grateful that the results are no worse than are so far evident.

In many states of the Union, boards of health have had their budgets cut, in some cases to an alarming extent. Personnel has been reduced and certain activities discontinued. One of the most serious things which have happened to public health is the curtailment of funds for the U. S. Public Health Service. When the drought hit hardest, the government was in a position to appropriate money to be apportioned by the Service in aiding the affected states for one year. Then a bill was brought in which passed through the Senate without a dissenting vote, increasing by three times the amount for assistance, and extending the aid to every state in the Union which needed it. Some thought that this provision would insure its passage. Nevertheless, the bill was killed, and assistance for the drought areas by our government ceased.

Recently we have had a report from the Surgeon General of the Public Health Service which tells of the cuts which will be in effect for the fiscal year beginning July 1, 1933. The total amount allowed by the Bureau of the Budget is $7,860,000, although $10,380,328 was appropriated by Congress. This means, of course, extensive curtailment of activities, although every effort is being made to keep those which are essential in motion. The salaries of all officers have been cut 15 per cent. Further savings have been effected by retiring a number of commissioned medical officers, some of whom are well known to the profession of the United States and Europe, and whose services can ill be spared. The marine hospitals and field relief stations have been cut to $4,420,000 from $5,600,000. In some quarters there has been a feeling that sick people will be taken care of, regardless of government help. Aid for county health units in 28 states which have been assisted by the Public Health Service will be cut off, and there is little doubt that many of these will be abandoned, though it is hoped that the states and counties will continue as many of them as possible.

The quarantine and immigration services in foreign ports have been greatly reduced, some 10 American physicians having been discharged; others, together with 700 acting assistant surgeons on part-time service, have suffered reductions in salaries.

What many will feel as a peculiar injury is the reduction by some 50 per cent of funds for scientific research. This will come at a time when the new buildings of the National Institute of Health, in which we might well hope for an increase of research, are nearing completion. The list of employees dropped is large; 13 from the Washington office, 650 from field stations, and 310 from rural sanitation. Some 1,500 others will be required to take 5 days vacation each month without pay.

All the readers of this *Journal* recognize what President Cleveland once said—that we are confronted by a condition and not a theory—yet we believe that cutting appropriations for health work is the poorest sort of economy. Health is wealth, and no nation has ever been great and maintained its greatness on a feeble population. Doubtless some economies can be made without injury to the protection afforded by the Public Health Service and the National Institute of Health, but we must still hope for expansion, rather than contraction, and entirely apart from how it may affect individuals, all anxiously look forward to the day when liberal funds will again be supplied and full activities be resumed. All of our members and readers should urge this point of view, and do all they can to keep appropriations for public health purposes at the highest possible level.

MALARIAL FEVER

ONE of the distinctive services rendered to the world by the Health Organization of the League of Nations has been its outstanding studies on malaria. Presumably even to those who live in malarial countries and know something of its ravages, the reports made by the League of Nations since its Commission was established in 1923 have been astonishing. Three major reports have been issued, the last one before the present showing the requirements for quinine in malarial countries and the prevalence of the disease. The use of quinine increased threefold from about 1880 to 1911, and the price has also increased threefold since

1892. The annual purchase of quinine was estimated at some 12 million dollars, though it is common knowledge in every country that a large portion of those infected with malaria do not receive specific treatment.

The last report treats of the therapeutics of malaria. Since there is no disease in which the sterilization of cases is more important as a matter of prevention than malaria, this report is of great interest from the prophylactic standpoint. There are several apparent contradictions in the behavior of malaria which render treatment and sterilization difficult. When the mosquito cycle of the malarial parasite was demonstrated, some believed that the disease could be overcome by making a break in the epidemiological chain by the use of quinine to destroy the parasite in the human host. Others believed that the destruction of the carrier mosquito, as well as of breeding places, offered the best success. It can now be said, on the evidence of extensive field experiments, that quinine has always failed as a mass preventive, and though we know it cures developed attacks, it does not always prevent either man or the mosquito from becoming infected.

One of the great problems of the Commission was to answer questions as to the prevention of infection, the prevention of relapses, and the determination of a mass treatment which would destroy gametocytes and thus prevent infection of mosquitoes. They state categorically that no drug is known, which, taken in doses which are not injurious during the infection, will effectively destroy the sporozoites of malaria before they are able to continue their life cycle in the human host. There is no drug nor any combination of drugs which will positively kill all parasites in the human host, and certainly prevent relapse.

The Commission further disapproves of attempts to bring about sterilization of all parasites during first attacks, and recognizes that nature provides a defensive mechanism which in the course of time produces immunity. Where sterilization is complete, this immunity is not developed. The frequency as well as the severity of relapses depends largely on the defensive powers of the infected person, and though this may be natural in some cases, it is also acquired. Consequently, the infected person should be allowed to develop this acquired immunity as well as the defensive power, if possible. If treated by large and continuous doses of specific drugs, they do not have an opportunity of developing defense, and experience has shown that, as a rule, such persons relapse every month over a long period. For this reason no attempt is made to prescribe a treatment for the prevention of relapses during the primary attack, and use of the specific drug at a later period and more sparingly during later recrudescences is advised. This applies particularly to benign tertian and quartan types of fever. For malignant tertian (*Aestivo autumnal*) it is considered justifiable to sterilize by specific drugs during the first recrudescence. In conditions in which it is not considered justifiable positively to prevent relapses, a system of clinical prophylaxis, which consists of giving 6 grains of quinine daily throughout a period of residence in a malarial country, and for some months after, is advocated. This does not completely eradicate the infection, so the defensive mechanism of the body is allowed to work and become increasingly powerful; it reduces the number of gametocyte carriers and their capacity for infecting mosquitoes, and at the same time enables agricultural and other workers to pursue their tasks.

Gametocytes are produced in greater numbers in primary attacks and early recrudescences than later, so that in highly endemic areas, little could be accomplished in preventing transmission of malaria without treatment of infants and children. It seems that in such areas adults seldom carry a sufficient number

of gametocytes to insure the infection of mosquitoes, and this is probably one of the reasons why mass treatment usually gives poor results.

The Commission repeatedly asserts that treatment with quinine can never be regarded as a *therapia sterilisans magna*. Knowledge of malaria now seems to be advancing after standing practically still for a number of years. This is attributed to the study of the biological aspects of the subject, while the discovery of effective synthetic antimalarial remedies has led to many experiments and to a promise of improvements in the treatment of the disease. A clear, and we believe useful, practical distinction is drawn between sporozoite therapy, which is called true causal prophylaxis, and clinical prophylaxis. For the first, it is the opinion that no drug is known which in harmless doses can be considered certainly effective. For the second, quinine is the most effective and best drug known, and daily doses of 6 grains are advised.

As far as the prevention of spread goes—and in this we are particularly interested—quinine and atebrin are effective in benign tertian and quartan, but against the gametocytes of malignant tertian (*Aestivo autumnal*) these drugs have only a feeble action. Plasmoquine has a powerful action against them, and it is recommended that it be given twice a week during the time when crescents are present in the peripheral blood. In badly infected areas (in Lagos, 90 per cent of the young children and 50 per cent of adults harbor malignant tertian parasites in their blood, and neighboring rural districts in all probability practically the entire population over 1 year of age, some 120,000 persons, carry malarial parasites in their blood continuously) it may become possible to substitute for present schemes of mass treatment a rational plan which will stop malaria from being fatal and mitigate its severity without interfering with the process leading to acquired immunity, which the Commission believes is most important to adult populations. In 1927, the Commission advised countries in which malaria was extremely prevalent to content themselves with the organization of their public health service on these principles, rather than to undertake such radical measures as are necessary for the complete elimination of the parasites.

REFERENCE

1. The Therapeutics of Malaria. Third General Report of the Malaria Commission. *Quarterly Bulletin of the Health Organization of the League of Nations.* II:2 (June), 1933.

NONSPECIFIC IMMUNITY BY HETEROLOGOUS VACCINATION

IMMUNITY is one of the most interesting as well as most important reactions of which we have any knowledge. Almost from time immemorial, it has been known that one attack of most contagious diseases protected from a second, generally throughout life. The first to theorize rationally on the subject and propose explanations of immunity was Pasteur, who discovered the first bacterial vaccine, when he found that attenuated cultures of the chicken cholera organism would protect against virulent ones. From that time on, experiments have been brought forward with confusing rapidity, and while we can say certainly that we know a good deal about immunity in general, and certain types of immunity in particular, there are still many points which remain to be clarified.

A recent piece of work is of more than usual importance. Armstrong and Harrison [1] have carried out experiments on a large number of animals immunized

against tetanus and botulinus, vaccine virus, and antityphoid vaccine, using normal saline injections as controls. After a proper period, these animals were injected with known fatal doses of diphtheria toxin-antitoxin, poliomyelitis virus, and cultures of *B. prodigiosus*. The general conclusion is that the various substances against which the animals were immunized exercised a subsequent protective action against the infectious and toxic agents used. The authors believe that this increased resistance is due to a "mobilization, strengthening and training of the defense mechanism." They recognize that increased resistance produced through heterologous immunization is only relative, and is not very strong, though they believe that the evidence indicates that it may be of value in modifying the course of such subsequent infections as poliomyelitis and postvaccinal encephalitis, as well as in increasing resistance to various subsequent infections.

In a review of the literature, it is pointed out that as early as 1893, Klein found that intraperitoneal injections of several varieties of bacteria would render guinea pigs refractory to known fatal doses of the same or other germs given from 8 to 12 hours later by the same route. These experiments have been confirmed by a number of observers, and some have even shown that preliminary intraperitoneal injections of various substances—bouillon, peptone, urine, etc.—would give a certain degree of immunity. In a few instances, the immunity against certain bacteria such as *B. cholerae*, was quite marked. The experiments cited include injections with yeast and with virulent tubercle bacilli, the latter of which were said to have rendered guinea pigs refractory to a certain extent against virulent anthrax. Vaccination against tuberculosis on a large scale, as carried out by Calmette with BCG, indicates that this nonspecific immunity notably reduces the general mortality of infants.

The increased protection by heterologous vaccines has been attributed to a cross-immunity, which is assumed and does not appear ever to have been proved. Armstrong and Harrison discredit this explanation on account of the great variety of substances which have been found capable of inducing increased resistance, and also the failure to find antibodies in the serum which show any cross-protection. They discuss also the fact noted in various camps during the World War, that recruits from rural areas were much more subject to infectious diseases than those who came from cities. An unusually striking instance of this was observed among two groups of Missouri recruits. The explanation in the majority of these cases seems clearly to be that urban dwellers are much more exposed to the ordinary so-called infectious diseases of childhood, but the point has been made by Love and Davenport that this would hardly account for the lowering in the incidence of such diseases as lobar pneumonia and cerebrospinal meningitis.

Long ago, Metchnikoff attributed such increased resistance to the breaking up of the phagocytes (phagolysis) and the setting free of cytase, at least as far as those cases in which some immunity is induced by intraperitoneal injections of bouillon. The general fact remains that as we grow older, we are apt to become less susceptible to certain infectious diseases, and this has been variously attributed to mild and unrecognized attacks or to vaccination by small, non-clinical, disease-producing infections. The whole matter is of extreme interest and importance, to which the contribution referred to has added valuable material.

REFERENCE

1. Armstrong, Charles, and Harrison, W. T. Heterologous Experience (Immunization) as a Factor in Resistance to Disease. *Pub. Health Rep.*, June 2, 1933, pp. 597–609.

Letter to the Editor

To the Editor:

I desire to caution rural health officers in placing blind confidence or reliance in the immunization results obtained and reported by Dr. William H. Park in his article in the June issue of the *Journal*, following the use of toxoid.

Dr. Park states that two doses of Ramon toxoid of from 5 to 10 flocculation units per c.c. will immunize 90 to 98 per cent of young children who receive it and a slightly smaller per centage of older children.

These excellent results may be expected in a city of the size of New York with its great aggregation of people, but not in rural sections. We must realize thoroughly the effect aggregation and other factors have on the whole diphtheria situation in coming to any conclusions on results obtained.

Doull has shown that 72 per cent of New York City children in the 10–14 age group were previously Schick negative. In Worcester County, Maryland, a rural county, we have found as the result of 1,050 previous Schick tests, that only 21 per cent of this specific age group were Schick negative. As negative previous Schick tests depend upon children possessing enough autogenous antitoxin, obtained by natural processes, to neutralize the toxin in the Schick, it is safe to assume that each individual child in the positive group in New York had a larger quantity of this antitoxin than the 79 per cent who were positive in Worcester County. It therefore follows that it is necessary for toxoid to stimulate a greater amount of antitoxin in each child in Worcester County, Maryland, or in any other rural community, to render it Schick negative.

A series of 1,208 Schick tests have just been completed in the above named rural community, one year after each child in the series had received two doses of the Ramon toxoid of 5 to 10 flocculation units per c.c. Only 69 per cent of the white children in this group were rendered Schick negative.

The writer predicts that as the evidence is collected, as to the lack of response of rural children to the Ramon toxoid, either the antigenic content of this type toxoid will have to be increased or the Ramon toxoid will be completely replaced by the Havens' type alum-precipitated toxoid.

A series of 100 colored children were given a 1 c.c. dose of the Havens' toxoid, all of whom were previously Schick positive. Six to seven weeks later, Schick tests were done on 93 of these children and 92 or 98.8 per cent were found Schick negative.

It should be noted that control tests were done on all the children mentioned to eliminate the pseudo-positive reaction.

If rural health officers all over the country rely implicitly on Dr. Park's results and eliminate the subsequent Schick test to check the results obtained in each locality, unfortunate occurrences will develop in the future which will shake the public's confidence in diphtheria immunization.

I shall be glad to submit in detail the results of the diphtheria immunization work carried on in a strictly rural county at the next annual meeting.

BRADFORD MASSEY, M.D.,
Deputy State Health Officer.

Pocomoke City, Md.,
June 27, 1933.

PRELIMINARY PROGRAM OF THE SIXTY-SECOND ANNUAL MEETING AMERICAN PUBLIC HEALTH ASSOCIATION

INDIANAPOLIS, IND., OCTOBER 9–12, 1933

THE Annual Meeting Program Committee presents the preliminary program of the scientific sessions of the Sixty-second Annual Meeting of the American Public Health Association and information concerning meetings of related organizations.

The program of the Institute on Health Education to be held October 7, 8 and 9 will be found on pages 968 and 969.

Since the following program cannot be considered definite in every respect now, delegates are urged to consult the Final Program, available at the Registration Desk in the Claypool Hotel at the time of the meeting. All meetings, unless otherwise stated, will be held in the Claypool Hotel.

Monday, 9:30 A.M.

HEALTH OFFICERS

First Session—Travertine Room, Lincoln Hotel

An **Unusual Outbreak of Para-Typhoid A.** JOSEPH P. FRANKLIN, M.D., Health Officer, Allegany County, Cumberland, Md.

Discussion. G. FOARD MCGINNES, M.D., Director of Laboratories, State Department of Health, Richmond, Va.

Heart Disease. LOUIS I. DUBLIN, PH.D., Third Vice-President and Statistician, and DONALD B. ARMSTRONG, M.D., Third Vice-President, Metropolitan Life Insurance Company, New York, N. Y.

Responsibility for the Health Program. MORRIS FISHBEIN, M.D., Editor, *Journal of the American Medical Association,* Chicago, Ill.

Discussion. CHARLES F. WILINSKY, M.D., Deputy Commissioner, Child Hygiene Division, Department of Health, Boston, Mass., and MATTHIAS NICOLL, JR., M.D., Commissioner of Health, Westchester County, White Plains, N. Y.

Section Business.

VITAL STATISTICS

First Session—Empire Room

Section Business. Appointment of Nominating Committee.

The Work and Plans of the Section Council. J. V. DEPORTE, PH.D., *Chairman* of the Section, Director, Division of Vital Statistics, State Department of Health, Albany, N. Y.

Monday, 9:30 A.M.

VITAL STATISTICS (Cont.)

First Session—Empire Room

Prospects for Completing the Registration Area (Report of the Committee). *Chairman,* T. F. MURPHY, M.D., Chief Statistician for Vital Statistics, Bureau of the Census, Washington, D. C.

Collection of Accident Statistics (Report of the Committee). *Chairman,* W. THURBER FALES, Sc.D., State Registrar, State Board of Health, Montgomery, Ala.

Discussion. R. L. FORNEY, National Safety Council, Chicago, Ill.

Should Birth and Death Certificates Be More Specific as to Residence for Purposes of Allocation? (Report of the Committee). *Chairman,* A. W. HEDRICH, Sc.D., Associate in Biostatistics, School of Hygiene and Public Health, Johns Hopkins University, Baltimore, Md.

Report of the Committee on Registration of Births of Illegitimate and Adopted Children. *Chairman,* SHELDON L. HOWARD, State Registrar, State Department of Public Health, Springfield, Ill.

Discussion. W. J. V. DEACON, M.D., State Department of Health, Lansing, Mich.

Procedure as to Filing Deferred Certificates (Report of the Committee). *Chairman,* STEWART G. THOMPSON, D.P.H., Director, Division of Vital Statistics, State Board of Health, Jacksonville, Fla.

Classification of Stillbirths (Progress Report of the Committee on Accuracy of Certified Causes of Death). *Chairman,* HAVEN EMERSON, M.D., Department of Public Health Administration, Columbia University, New York, N. Y.

EPIDEMIOLOGY

First Session—Assembly Room

Outbreak of an Erysipeloid Condition Among the Workers in a Bone Button Factory Due to the Bacillus of Swine Erysipelas. G. FOARD MCGINNES, M.D., Director of Laboratories, and FORREST SPINDLE, State Department of Health, Richmond, Va.

Diphtheria Studies: I. The Significance of the Schick Test in the Adult. C. C. YOUNG, D.P.H., Director; W. E. BUNNEY, PH.D., Associate Director; GEORGE D. CUMMINGS, Bacteriologist; MINNA CROOKS; and FILIP C. FORSBECK, M.D., Epidemiologist; State Department of Health Laboratories, Lansing, Mich.

Measles Epidemic in Albany, New York, in 1926–1927. EDWARD S. GODFREY, JR., M.D., Director, Local Health Administration, State Department of Health, Albany, N. Y. (*Stereopticon Illustration.*)

The Epidemiology of Lobar Pneumonia. WILSON G. SMILLIE, M.D., Professor of Public Health Administration, Harvard University School of Public Health, Boston, Mass., and FREDERICK S. LEEDER, M.D., Medical Director, Southern Berkshire Health District, Brookline, Mass. (*Stereopticon Illustration.*)

Rocky Mountain Spotted Fever: Observations on Epidemiology with Particular Reference to the Western United States. R. R. PARKER, PH.D., In Charge, Rocky Mountain Spotted Fever Investigations, U. S. Public Health Service, Hamilton, Mont. (*Stereopticon Illustration.*)

Section Business.

Monday, 9:30 A.M.

INDUSTRIAL HYGIENE

First Session—Club Room

Industrial **Intoxication Following Skin Sorption.** CAREY P. MCCORD, M.D., *Chairman* of the Section, and Medical Director, Industrial Health Conservancy Laboratories, Cincinnati, O.

X-Ray **Findings in So-Called Acute Silicosis.** HOMER L. SAMPSON, Director, Trudeau Sanatorium, Trudeau, N. Y.

The **Pathological Lesions in So-Called Acute Silicosis.** LEROY U. GARDNER, M.D., Director, Saranac Laboratory for the Study of Tuberculosis, Saranac Lake, N. Y.

The **Silica Content of the Lungs of a Group of Tunnel Workers.** CLAYTON S. SMITH, PH.D., and HELEN L. WIKOFF, PH.D., Laboratory of Physiological Chemistry and Pharmacology, Ohio State University, Columbus, O.

Section Business.

CHILD HYGIENE AND PUBLIC HEALTH NURSING SECTIONS AND THE AMERICAN ASSOCIATION OF SCHOOL PHYSICIANS

Joint Session—Riley Room

SCHOOL HEALTH PROGRAMS

Scarlet Fever Immunization. O. B. NESBIT, M.D., Board of Education, Gary, Ind.

Discussion. GEORGE H. RAMSEY, M.D., Director, Division of Communicable Diseases, State Department of Health, Albany, N. Y.

Educator's Viewpoint. DELBERT OBERTEUFFER, PH.D., Ohio State University, Columbus, O.

Discussion.

Medical Viewpoint. GEORGE B. DARLING, DR.P.H., W. K. Kellogg Foundation, Battle Creek, Mich.

Discussion.

Nurse's Viewpoint. NELLIE PALMER, R.N., Bureau of Nursing, Board of Education, Des Moines, Ia.

Discussion.

Conducted Tour of the Exhibits.

Monday, 12:30 P.M.

PUBLIC HEALTH NURSING

Luncheon Session—Chateau Room

Section Business.

Monday, 2:30 P.M.

HEALTH OFFICERS

Second Session—Riley Room

MODERN TRENDS IN PUBLIC HEALTH ADMINISTRATION

State Health Work. E. L. BISHOP, M.D., State Commissioner of Public Health, Nashville, Tenn.

City Health Work. JOHN P. KOEHLER, M.D., Commissioner of Health, Milwaukee, Wis.

County Health Work. JOSEPH W. MOUNTIN, M.D., Surgeon, U. S. Public Health Service, Washington, D. C.

LABORATORY

First Session—Assembly Room

Presiding: ANNA W. WILLIAMS, M.D., *Chairman,* Laboratory Section.

Address. ANNA W. WILLIAMS, M.D., Bureau of Laboratories, Department of Health, New York, N. Y.

Report of the Committee on Standard Methods. *Chairman,* AUGUSTUS B. WADSWORTH, M.D., Division of Laboratories and Research, State Department of Health, Albany, N. Y.

Laboratory Problems in Milk Pasteurization (Preliminary Report of the Committee on Milk Pasteurization Studies). *Chairman,* ROBERT S. BREED, PH.D., New York State Agricultural Experiment Station, Geneva, N. Y.

Report of the Committee on Water Pollution Studies. *Chairman,* JAMES A. NEWLANDS, Henry Souther Engineering Company, Hartford, Conn.

Report of the Committee on Bathing Places. *Chairman,* W. D. STOVALL, M.D., State Laboratory of Hygiene, Madison, Wis.

SYMPOSIUM ON THE CONTROL OF FOOD HANDLERS AND THE DETECTION OF CARRIERS AMONG THEM

Detection by Laboratory Methods of Disease Carriers Among Food and Drink Handlers. RALPH EMERSON DUNCAN, M.D., Department of Health, Kansas City, Mo.

Control of Food Poisoning with Reference to the Medical and Laboratory Examination of Food Handlers. JACQUES P. GRAY, M.D., Department of Public Health, San Francisco, Calif.

The Feasibility of Attempting to Control Enteric Disease by the Examination of Specimens from Food Handlers. RUTH GILBERT, M.D., and MARION B. COLEMAN, Division of Laboratories and Research, State Department of Health, Albany, N. Y.

Value of Duodenal Aspiration in Diagnosis of Chronic Fecal Typhoid Carriers. LLOYD ARNOLD, M.D., and LARS GULBRANDSEN, Department of Bacteriology and Preventive Medicine, University of Illinois, College of Medicine, Chicago, Ill.

Monday, 2:30 P.M.

FOOD AND NUTRITION

First Session—Lincoln Room, Lincoln Hotel

Nutrition in the Public Health Program. LYDIA J. ROBERTS, PH.D., Chairman, Department of Home Economics, University of Chicago, Chicago, Ill.

Nutrition and Family Food Budgets. LUCY GILLETT, Association for Improving the Condition of the Poor, New York, N. Y.

Pellagra. W. H. SEBRELL, National Institute of Health, Washington, D. C.

Dietary Investigations Bearing on Pellagra. MARGARET R. SANDELS, PH.D., Educator, Teaching and Investigations in Nutrition, Florida State College for Women, Tallahassee, Fla.

Theory of the Etiology of Pellagra. J. C. NORRIS, M.D., Associate Professor of Pathology and Public Health, Emory University, Atlanta, Ga.

Vitamin G Deficiency. PAUL R. DAY, M.D., School of Medicine, University of Arkansas, Little Rock, Ark.

Report of the Committee on Nutrition. *Chairman,* PROFESSOR HENRY C. SHERMAN, Department of Chemistry, Columbia University, New York, N. Y.

PUBLIC HEALTH ENGINEERING SECTION AND CONFERENCE OF STATE SANITARY ENGINEERS

Joint Session—Palm Room

Presiding: L. F. WARRICK, *Chairman,* Conference of State Sanitary Engineers.

When Are Milk Containers and Equipment Clean and Sterile? (Report of the Committee on Milk Supplies). *Chairman,* C. A. HOLMQUIST, Director, Division of Sanitation, State Department of Health, Albany, N. Y.

Report of the Joint Committee on Rural Sanitation. *Chairman,* H. E. MILLER, Special Expert, U. S. Public Health Service, Norfolk, Va.

The Sanitary Works of Indianapolis. C. K. CALVERT, Sanitary District of Indianapolis, Indianapolis, Ind.

Discussion. L. A. GEUPEL, Chief Engineer, Department of Sanitary Engineering, State Board of Health, Indianapolis, Ind.

Present Status of the Program of the Tri-State Treaty Commission on Abatement of Pollution of Harbor and Coastal Waters within the (N. Y.) Metropolitan Area. F. S. TAINTER, Engineer, New York, N. Y.

Discussion. C. A. HOLMQUIST, Director, Division of Sanitation, State Department of Health, Albany, N. Y.

Monday, 6:30 P.M.

PUBLIC HEALTH EDUCATION

Dinner Session—Louis XV Parlor

Closed Session—for Fellows and Members of the Section only

Section Business.

Monday, 8:00 P.M.

FIRST GENERAL SESSION

Riley Room

Invocation.

Address of Welcome. WILLIAM F. KING, M.D., Chairman of the Local Committee, Indianapolis, Ind.

Address of the President of the American Public Health Association. America's Contributions and Problems in Public Health. JOHN A. FERRELL, M.D., Associate Director, International Health Division, The Rockefeller Foundation, New York, N. Y.

Announcement of Awards.

Reception and Dancing.

Tuesday, 9:30 A.M.

INDUSTRIAL HYGIENE

Second Session—Club Room

Poisoning by Petroleum Distillates—Case Reports. EMERY R. HAYHURST, M.D., PH.D., Consulting Industrial Hygienist, Columbus, O.

Treatment of Cyanide Poisoning. K. K. CHEN, PH.D., CHARLES L. ROSE and G. H. A. CLOWES, PH.D., Lilly Research Laboratories, Indianapolis, Ind.

Dermatitis in the Oil Refining Industry. LOUIS SCHWARTZ, M.D., U. S. Public Health Service, New York, N. Y.

Visual Disturbances Due to Carbon Tetrachloride—Case Reports. ZOLTON T. WIRTSCHAFTER, M.D., Medical Consultant, State Federation of Labor, Cleveland, O.

Conducted Tour of the Exhibits.

PUBLIC HEALTH EDUCATION

First Session—Lincoln Room, Lincoln Hotel

THE ORGANIZATION OF ADULT GROUPS FOR HEALTH EDUCATION

In Cities. MARY P. CONNOLLY, Director, Division of Health Education, Department of Health, Detroit, Mich.

In Rural Districts. W. W. PATTY, M.D., Director, Physical Welfare Training Department, Indiana University, Indianapolis, Ind.

PUBLIC HEALTH ENGINEERING

First Session—Palm Room

SYMPOSIUM ON PUBLIC HEALTH ENGINEERING PROBLEMS OF LARGE COMMUNITIES

The Growth of American Cities. HOWARD W. GREEN, Secretary, Cleveland Health Council, Cleveland, O.

Keeping Up with the Demand for Adequate Pure Water. HARRY E. JORDAN, Filtration Engineer, Indianapolis Water Company, Indianapolis, Ind.

Tuesday, 9:30 A.M.

PUBLIC HEALTH ENGINEERING (Cont.)

First Session—Palm Room

Liquid **Wastes: Their Treatment and Disposal.** LANGDON PEARSE, Sanitary Engineer, Sanitary District of Chicago, Chicago, Ill.

Practical **Application of Milk Control.** J. R. JENNINGS, Chief, Milk Control Division, Department of Public Health, Louisville, Ky.

Can **Refuse Collection and Disposal Systems Be Improved?** H. P. EDDY, JR., Metcalf and Eddy, Boston, Mass.

The **Air We Breathe and the Sounds We Hear.** JOEL I. CONNOLLY, Board of Health, Chicago, Ill.

Mosquitoes Have No Place in a City. RALPH E. TARBETT, Sanitary Engineer, U. S. Public Health Service, Washington, D. C.

Section Business.

HEALTH OFFICERS, LABORATORY AND EPIDEMIOLOGY SECTIONS

Joint Session—Assembly Room

SYMPOSIUM: WHAT ARE THE ESSENTIALS OF TYPHOID FEVER CONTROL TODAY?

Presiding: ROBERT H. RILEY, M.D., *Chairman,* Health Officers Section; WADE H. FROST, M.D., *Chairman,* Epidemiology Section; and RUTH GILBERT, M.D., representing the Laboratory Section.

For the Epidemiology Section—GEORGE H. RAMSEY, M.D., Director, Division of Communicable Diseases, State Department of Health, Albany, N. Y.

For the Health Officers Section—A. J. CHESLEY, M.D., Executive Officer, State Board of Health, St. Paul, Minn.

For the Laboratory Section—E. O. JORDAN, PH.D., Department of Hygiene and Bacteriology, University of Chicago, Chicago, Ill.

Discussion. WILLIAM H. PARK, M.D., Director, Bureau of Laboratories, Department of Health, New York, N. Y.; D. F. MILAM, M.D., Epidemiologist, State Department of Health, Raleigh, N. C.; and L. L. LUMSDEN, M.D., U. S. Public Health Service, New Orleans, La.

Conducted Tour of the Exhibits.

CHILD HYGIENE

First Session—Travertine Room, Lincoln Hotel

(Special invitation extended to members of the American Association of School Physicians)

NEW AND INTERESTING DEVELOPMENTS IN THE CHILD HEALTH FIELD

Health Education in the Virgin Islands. SALLY LUCAS JEAN, Health Consultant, New York, N. Y.

Discussion. PAULINE BROOKS WILLIAMSON, Chief, School Health Bureau, Welfare Division, Metropolitan Life Insurance Company, New York, N. Y.

Tuesday, 9:30 A.M.

CHILD HYGIENE (Cont.)

First Session—Travertine Room, Lincoln Hotel

Some Public Health Aspects of Maternal Mortality. FRANCES C. ROTHERT, M.D., Associate Medical Officer, U. S. Children's Bureau, Washington, D. C.

Coördination of Nursery School and Public Health Nursing Service. GENEVA F. HOILIEN, R.N., Director, Albany Guild for Public Health Nursing, Albany, N. Y.

Discussion. HUNTINGTON WILLIAMS, M.D., Commissioner of Health, Baltimore, Md.

Motivating Teacher Participation in New Type Health Activity. RUTH HEAVENRIDGE, Teacher-Director, Special Classes for Indianapolis Public Schools, Indianapolis, Ind.

Discussion. AMELIA T. WOOD, Director, Health Service, Ball State Teachers' College, Muncie, Ind.

Tuesday, 12:30 P.M.

INDUSTRIAL HYGIENE

Luncheon Session—Chateau Room

Report of the Committee on Standard Practices in the Problem of Compensation of Occupational Diseases. *Chairman,* HENRY H. KESSLER, M.D., State Department of Labor, Newark, N. J.

Report of the Committee on Pneumonoconiosis. *Chairman,* R. R. SAYERS, M.D., U. S. Bureau of Mines, Washington, D. C.

Tuesday, 2:30 P.M.

PUBLIC HEALTH NURSING

First Session—Assembly Room

THE CONTRIBUTION OF PUBLIC HEALTH NURSING TO VARIOUS PHASES OF THE PUBLIC HEALTH PROGRAM

To Communicable Disease Control. MARGUERITE A. WALES, R.N., General Director of Nurses, Henry Street Settlement Visiting Nurse Service, New York, N. Y.

Discussion. LOUISE KUCK TOOKER, R.N., Superintendent of Nurses, Department of Health, Cincinnati, O.

To the School Age Group. MARION G. RANDALL, R.N., Division of Research, Milbank Memorial Fund, New York, N. Y.

To the Maternity, Infancy and Preschool Age Group. AGNES G. TALCOTT, R.N., Director of Nurses, Department of Health, Los Angeles, Calif.

How to Make Public Health Nursing Fit into a Budget. ALMA C. HAUPT, R.N., Associate Director, National Organization for Public Health Nursing, New York, N. Y.

Tuesday, 2:30 P.M.

PUBLIC HEALTH ENGINEERING

Second Session—Palm Room

Effect of **Economic Conditions on Public Health Engineering Work.** MALCOLM PIRNIE, Civil Engineer, New York, N. Y.

Discussion.

A View of **Environmental Sanitation in the Control of Communicable Diseases.** WADE H. FROST, M.D., School of Hygiene and Public Health, Johns Hopkins University, Baltimore, Md.

Discussion. ARTHUR E. GORMAN, Engineer of Water Purification, Department of Public Works, Chicago, Ill.

Some **Factors Involved in the Use of Chloramines for the Disinfection of Swimming Pool Waters.** A. H. FLETCHER, Director, Bureau of Sanitation, Department of Health, Memphis, Tenn., and E. C. LINK, Director, Bureau of Laboratories, State Department of Health, Nashville, Tenn.

A **Hypochlorite Feeding Device.** F. R. SHAW, Sanitary Engineer, U. S. Public Health Service, Chicago, Ill.

VITAL STATISTICS

Second Session—Club Room

Has **Diabetes Become More Prevalent?** CHARLES BOLDUAN, M.D., Director of Health Education, Department of Health, New York, N. Y.

Death **Rates from Puerperal Septicemia in Large Cities, 1922 to 1929.** GAIUS B. HARMON, M.D., Associate Professor of Hygiene, School of Medicine, Western Reserve University, Cleveland, O.

DISCUSSION OF REGISTRATION PROBLEMS

Adjustment of Vital Statistics Divisions to Depression Budgets.

Discussion opened by: W. THURBER FALES, Sc.D., State Registrar, State Board of Health, Montgomery, Ala., and CARL E. BUCK, DR.P.H., Field Director, American Public Health Association, New York, N. Y.

Section Business. Election of Officers.

PUBLIC HEALTH EDUCATION

Second Session—Lincoln Room, Lincoln Hotel

RETAILING HEALTH INFORMATION AND IDEAS

Campaign Plans for Thorough Coverage of a Given City.

A Plan to Increase Understanding of the Value of Scientific Medicine. T. J. EDMONDS, Executive Secretary, Iowa Tuberculosis Association, Des Moines, Ia.

Reaching the Negro Community. M. O. BOUSFIELD, M.D., First Vice-President and Medical Director, Supreme Liberty Life Insurance Company, Chicago, Ill.

Outline for a Social Hygiene Educational Campaign. MARGARET WELLS WOOD, American Social Hygiene Association, New York, N. Y.

Discussion.

Tuesday, 2:30 P.M.

LABORATORY AND FOOD AND NUTRITION SECTIONS

Joint Session—Riley Room

SYMPOSIUM ON MICROBIOLOGICAL EXAMINATION OF FOOD PRODUCTS

Presiding: CARL R. FELLERS, PH.D., *Chairman,* Food and Nutrition Section, and ROBERT S. BREED, PH.D., *Vice-Chairman,* Laboratory Section.

Need for Uniform Practices in the Microbiological Examination of Food Products. LAWRENCE H. JAMES, PH.D., Food Research Division, U. S. Bureau of Chemistry and Soils, Department of Agriculture, Washington, D. C.

Factors Involved in the Microbiological Examination of Canned Foods. E. J. CAMERON, PH.D., Bacteriologist, National Canners' Association, Washington, D. C.

The Examination of Fermented Foods by Laboratory Methods. CARL S. PEDERSON, PH.D., Bacteriologist, New York State Agricultural Experiment Station, Geneva, N. Y.

The Microbiological Examination of Fresh and Frozen Fruits and Vegetables. F. W. TANNER, PH.D., Department of Bacteriology, University of Illinois, Urbana, Ill.

The Need for Methods for the Bacteriological Examination of Crustacea. A. C. HUNTER, PH.D., U. S. Food and Drug Administration, Department of Agriculture, Washington, D. C.

Suggested Laboratory Procedures for Use in Determining the Cause of Food Poisonings. S. A. KOSER, PH.D., Department of Hygiene and Bacteriology, University of Chicago, Chicago, Ill.

Tuesday, 6:30 P.M.

FOOD AND NUTRITION

Dinner Session—Chateau Room

Section Business.

PUBLIC HEALTH ENGINEERING

Joint Dinner—Travertine Room, Lincoln Hotel

Public Health Engineering Section and Conference of State Sanitary Engineers. Annual Engineers' Stag Dinner Party. Toastmaster—"BILL" ORCHARD, Wallace & Tiernan Company, Newark, N. J.

Tuesday, 7:00 P.M.

PROFESSIONAL EDUCATION

Dinner Session—Riley Room

Presiding: W. S. LEATHERS, M.D., *Chairman,* Committee on Professional Education.

Policies and Objectives of the Committee on Professional Education. W. S. LEATHERS, M.D., School of Medicine, Vanderbilt University, Nashville, Tenn.

Elements Involved in Determining the Qualifications of Health Officers. E. L. BISHOP, M.D., State Commissioner of Public Health, Nashville, Tenn.

Tuesday, 7:00 P.M.

PROFESSIONAL EDUCATION (Cont.)

Dinner Session—Riley Room

Qualifications and Training of Local Health Officers. THOMAS PARRAN, JR., M.D., State Commissioner of Health, and DON M. GRISWOLD, M.D., State Department of Health, Albany, N. Y.

Discussion opened by: A. W. FREEMAN, M.D., Professor of Public Health Administration, School of Hygiene and Public Health, Johns Hopkins University, Baltimore, Md.

Wednesday, 9:30 A.M.

CHILD HYGIENE

Second Session—Travertine Room, Lincoln Hotel

(Special invitation extended to members of the American Association of School Physicians)

CHILD HEALTH DURING DEPRESSION YEARS—ECONOMIC ASPECTS

What **Economies Can Be Made in Programs with Least Detriment to the Health of the Children?** CARL E. BUCK, DR.P.H., Field Director, American Public Health Association, New York, N. Y.

Effect on Mental Health of Children. HENRY SCHUMACHER, M.D., Director, Child Guidance Clinic, Cleveland, O.

Effect on Physical Health of Children. MARTHA ELLIOT, Children's Bureau, Washington, D. C.

The Health and Growth of School Children During the Depression. ESTELLA F. WARNER, M.D., Surgeon, U. S. Public Health Service, Washington, D. C.

LABORATORY

Second Session—Medical Sub-Session—Chateau Room

SYMPOSIUM ON FILTERABLE VIRUSES

Presiding: ANNA W. WILLIAMS, M.D., *Chairman,* Laboratory Section.

Rabies Vaccine Protection Tests. JOHN REICHEL, V.M.D., and J. E. SCHNEIDER, Mulford Biological Laboratories, Glenolden, Pa.

Serological Studies on Vaccinia in Smallpox. RALPH S. MUCKENFUSS, Department of Bacteriology, School of Medicine, Washington University, St. Louis, Mo.

Cultivation of "Vaccine Virus" in Vitro. CHARLES R. TYLER and CAROLYN OLDENBUSCH, Department of Health Laboratories, New York, N. Y.

Purification of Vaccine Virus. MORRIS SHAEFFER, HELEN NALIBOW and ANNA GOLDBERG, New York University School of Medicine, New York, N. Y.

Wednesday, 9:30 A.M.

LABORATORY (Cont.)

Second Session—Medical Sub-Session—Chateau Room

Mechanism of Bacteriophage Lysis. J. BRONFENBRENNER, PH.D., D.P.H., Department of Bacteriology, School of Medicine, Washington University, St. Louis, Mo. (*Motion Picture Illustrations and Stereopticons.*)

The Relation of Filterable Viruses to the Pneumonias Complicating Measles, Influenza and Whooping Cough. H. A. MCCORDOCK, Department of Bacteriology, School of Medicine, Washington University, St. Louis, Mo.

Discussion of the Work on Postvaccinal Encephalitis and Tetanus. Discussion of Smallpox. CHARLES ARMSTRONG, M.D., National Institute of Health, Washington, D. C.

PUBLIC HEALTH ENGINEERING

Third Session—Palm Room

Chlorination in Sewage Disposal (Report of the Committee on Sewage Disposal). *Chairman,* LANGDON PEARSE, Sanitary Engineer, Sanitary District of Chicago, Chicago, Ill.

Report of the Committee on Fellowship and Membership. *Chairman,* LINN H. ENSLOW, Editor, *Water Works and Sewerage,* New York, N. Y.

Effect of Chemical Constituents in Water on the Human System (Report of the Committee on Water Supply). *Chairman,* J. R. BAYLIS, Physical Chemist, Department of Public Works, Chicago, Ill.

Fly Trapping. A. P. HITCHENS, Major, Medical Corps, U. S. Army, Fort Sheridan, Ill. (*Stereopticon Illustration.*)

Report of the Committee on Noise. *Chairman,* C. R. COX, Associate Sanitary Engineer, State Department of Health, Albany, N. Y. (To be read by title only.)

Report of the Committee on Promotion of Environmental Sanitation. *Chairman,* V. M. EHLERS, Chief Sanitary Engineer, State Department of Health, Austin, Tex. (To be read by title only.)

Conducted Tour of the Exhibits.

FOOD AND NUTRITION

Second Session—Club Room

The Proposed Federal Food and Drugs Act: Its Public Health Features. WALTER S. FRISBIE, Chemist, U. S. Food and Drug Administration, Department of Agriculture, Washington, D. C.

Sleep Motility as a Measure of the Effect of Different Types of Foods and Beverages on Nervousness. MELVILLE GIDDINGS, M.D., Professor of Medicine, Emory University, Atlanta, Ga.

New Mechanism of Defense Against Bacteria Through Use of Certain Foods. LLOYD ARNOLD, M.D., College of Medicine, University of Illinois, Chicago, Ill.

The Significance of Copper and Iron as Blood Restorers. C. A. ELVEHJEM, PH.D., University of Wisconsin, Madison, Wis.

Wednesday, 9:30 A.M.

FOOD AND NUTRITION (Cont.)

Second Session—Club Room

The **Present Status of Vitamin Standards.** E. M. NELSON, PH.D., Nutritionist, Bureau of Chemistry, U. S. Department of Agriculture, Washington, D. C.

Report of the **Committee on Foods.** *Chairman,* WALTER H. EDDY, PH.D., Teachers College, Columbia University, New York, N. Y.

Conducted **Tour of the Exhibits.**

EPIDEMIOLOGY

Second Session—Assembly Room

Tracing **of Transmission of Syphilis.** DUDLEY C. SMITH, M.D., and WILLIAM A. BRUMFIELD, M.D., Department of Syphilology and Dermatology, University of Virginia, Charlottesville, Va. (*Stereopticon Illustration.*)

The **Epidemiological Aspects of Tuberculosis Control in Massachusetts.** ALTON S. POPE, M.D., Director, Division of Tuberculosis, and GEORGE H. BIGELOW, M.D., State Commissioner of Public Health, State Department of Health, Boston, Mass. (*Stereopticon Illustration.*)

Newer **Aspects in the Prevention and Control of Scarlet Fever with a Report of 60,000 Complete Immunizations.** JOHN L. JONES, M.D., Epidemiologist, State Board of Health, Louisville, Ky.

The **Period of Isolation for Scarlet Fever.** JOHN E. GORDON, M.D., Director, Division of Epidemiology, Herman Kiefer Hospital, and GEORGE F. BADGER, Assistant to the Epidemiologist, Department of Health, Detroit, Mich. (*Stereopticon Illustration.*)

Exposure as a **Factor in the Age Distribution of Measles, Diphtheria and Poliomyelitis.** W. LLOYD AYCOCK, M.D., Assistant Professor, Preventive Medicine and Hygiene, Harvard Medical School, Boston, Mass.

VITAL STATISTICS AND PUBLIC HEALTH EDUCATION SECTIONS

Joint Session—Riley Room

NEWS VALUES IN HEALTH STATISTICS

Presiding: MARY SWAIN ROUTZAHN, *Chairman,* Public Health Education Section.

Does **the Press Want Health Statistics?** GEORGE H. VAN BUREN, Supervisor, Statistical Bureau, Metropolitan Life Insurance Company, New York, N. Y.

Local **Publicity Use of Statistics from National and State Sources.** H. J. SHELLEY, M.D., Health Officer, Middletown, N. Y.

Safeguards **in Publicity Uses of Statistics.** A. W. HEDRICH, SC.D., Associate in Biostatistics, School of Hygiene and Public Health, Johns Hopkins University, Baltimore, Md.

Discussion.

Conducted **Tour of the Exhibits.**

Wednesday, 9:30 A.M.

PUBLIC HEALTH NURSING

Second Session—Lincoln Room, Lincoln Hotel

TEAM-PLAY BETWEEN PUBLIC HEALTH NURSES AND THE MEDICAL PROFESSION

W. W. BAUER, M.D., Director, Bureau of Health and Public Instruction, American Medical Association, Chicago, Ill.

Discussion. M. LOUISE NICOL, R.N., District Supervising Nurse, Division of Child Hygiene and Public Health Nursing, State Department of Public Health, Springfield, Ill.

THE USE OF LAYMEN IN OFFICIAL PUBLIC HEALTH NURSING PROGRAMS

City. J. D. DOWLING, M.D., County Board of Health, Birmingham, Ala.

County. MRS. A. L. BLACKSTONE, Chairman, Waukesha County Health Committee, and Chairman, Committee on Public Welfare, State Federation of Women's Clubs, Waukesha, Wis.

State. MRS. ARCH TRAWICK, President, State Federation of Women's Clubs, Nashville, Tenn.

Discussion.

Wednesday, 12:30 P.M.

LABORATORY

Luncheon Session—Chateau Room

Section Business.

CHILD HYGIENE

Luncheon Session—Travertine Room, Lincoln Hotel

Section Business.

PUBLIC HEALTH EDUCATION

Luncheon Session—Riley Room

An Experience Meeting

Wednesday, 6:30 P.M.

SECOND GENERAL SESSION

Banquet—Riley Room

MEMORIAL SESSION TO DR. WALTER REED AND HIS ASSOCIATES ON THE YELLOW FEVER COMMISSION

In commemoration of the notable work which made possible the conquest of yellow fever and which was first announced by Dr. Reed at the American Public Health Association meeting in 1900, the Annual Banquet will be a memorial session with fitting exercises and ceremonies. The Surgeon-General of the United States Army, Major General Robert U. Patterson, and Dr. Frederick F. Russell, Director of the International Health Division, The Rockefeller Foundation, will speak.

Thursday, 9:30 A.M.

LABORATORY

Third Session—Milk Sanitation Sub-Session—Palm Room*

(Special Invitation Extended to Members of the International Association of Dairy and Milk Inspectors.)

Presiding: ROBERT S. BREED, PH.D., *Vice-Chairman,* Laboratory Section.

Studies on Acidophilus Therapy. C. N. STARK, PH.D., New York State College of Agriculture, Ithaca, N. Y.

Streptococci Found in Bovine Udders. G. J. HUCKER, PH.D., and P. ARNE HANSEN, New York State Agricultural Experiment Station, Geneva, N. Y.

Microbiological Methods for the Analysis of Butter. E. H. PARFITT, Milk Inspector, Dairy Department, Purdue University, Lafayette, Ind.

SYMPOSIUM ON STANDARD METHODS FOR THE BACTERIOLOGICAL EXAMINATION OF MILK

Bacterial Analysis of Ice Cream. F. W. FABIAN, PH.D., Michigan State College of Agriculture and Applied Science, East Lansing, Mich.

Methods of Examining Dairy Products for Members of the Escherichia-Aerobacter Group. M. H. MCCRADY, Chief of Laboratories, Provincial Bureau of Health, Montreal, Que.

A Comparative Study of Yeast and Beef Extract Media for Use in Routine Milk Control Work. C. S. BOWERS, Department of Health, New Britain, Conn.

The Effect of the Temperature of Incubators upon the Agar Plate Count in Routine Control Work. M. W. YALE, PH.D., and CARL S. PEDERSON, PH.D., Bacteriologist, New York State Agricultural Experiment Station, Geneva, N. Y.

Discussion. ROBERT S. BREED, PH.D., Referee, Chief in Research, New York State Agricultural Experiment Station, Geneva, N. Y.

* Fourth Session—Medical Sub-Session—meeting concurrently in Club Room.

Thursday, 9:30 A.M.

LABORATORY

Fourth Session—Medical Sub-Session—Club Room*

Presiding: ANNA W. WILLIAMS, M.D., *Chairman,* Laboratory Section.

Report of a Series of Cough Plate Examinations for Hemophilus pertussis. PEARL KENDRICK, Sc.D., and GRACE ELDERING, State Department of Health Laboratories, Western Michigan Division, Grand Rapids, Mich.

Human Immunization with Tetanus Toxoid. D. H. BERGEY, M.D., DR.P.H., Professor of Hygiene and Bacteriology, University of Pennsylvania, and S. ETRIS, Philadelphia, Pa.

Vaccine for Immunization Against Smallpox Prepared from Chicken Embryo Cultures. JULIA M. COFFEY, Division of Laboratories and Research, State Department of Health, Albany, N. Y.

Report of the Association Committee to Study the Efficacy of Typhoid Vaccines. T. F. SELLERS, M.D., State Department of Health, Atlanta, Ga.

The Isolation from Typhoid Fever Patients and Typhoid Carriers of Strains Which Have Properties Corresponding to Those of Certain Variants of B. Typhosus. RUTH GILBERT, M.D., and MARION B. COLEMAN, State Department of Health, Albany, N. Y.

Relationship of Shigella Alkalescens to Other Members of the Shigella Group. HENRY WELCH, PH.D., Research Biologist, and FRIEND LEE MICKLE, Director, Bureau of Laboratories, State Department of Health, Hartford, Conn.

Production of Antitoxins by Means of Bacteriophage. N. W. LARKUM, PH.D., Immunologist, State Department of Health, Lansing, Mich.

The Pathogenicity of Certain Species of Monilia for Laboratory Animals. W. D. STOVALL, M.D., State Hygienic Laboratory, Madison, Wis.

Practical Method for Public Health Laboratory Diagnosis of Infectious Syphilis. HERBERT E. MCDANIELS, Research Laboratories, State Department of Public Health, Chicago, Ill.

A Survey of One Thousand Gonococcus Complement-Fixation Tests Performed with the Serums of Female Patients in an Outpatient Clinic. WALTER M. BRUNET, M.D., and B. S. LEVINE, PH.D., Urological Division and the Clinical Laboratory, Public Health Institute, Chicago, Ill.

* Third Session—Milk Sanitation Sub-Session—meeting concurrently in Palm Room.

HEALTH OFFICERS

Third Session—Assembly Room

The Evaluation of Various Procedures in Diphtheria Control. HERMAN N. BUNDESEN, M.D., President, Board of Health, Chicago, Ill.

Discussion. JAMES ROBERTS, M.D., Medical Officer of Health, Hamilton, Ont.

Developments in Health Administration in the Province of Quebec. ALPHONSE LESSARD, M.D., Director, Provincial Bureau of Health, Quebec, Que.

Medical Participation in the Program of the W. K. Kellogg Foundation. STUART PRITCHARD, M.D., Battle Creek, Mich.

The Sanitary Supervision of Food Handling Establishments. SEVERANCE BURRAGE, Associate Professor, Department of Bacteriology and Public Health, University of Colorado, Denver, Colo.

Thursday, 9:30 A.M.

CHILD HYGIENE SECTION, AMERICAN SOCIAL HYGIENE ASSOCIATION AND AMERICAN ASSOCIATION OF SCHOOL PHYSICIANS

Joint Session—Chateau Room

CONGENITAL SYPHILIS

Presiding: THURMAN B. RICE, M.D., Professor of Bacteriology and Pathology, Indiana University, School of Medicine, Indianapolis, Ind.

Medical **Aspects.** P. C. JEANS, M.D., Department of Pediatrics, University of Iowa Medical School, Iowa City, Ia.

What **Can Be Done Regarding Congenital Syphilis Among School Children?** DON W. GUDAKUNST, M.D., Director, School Health Service, Department of Health, Detroit, Mich.

The **Prevention of Congenital Syphilis.** JAMES R. MCCORD, M.D., Department of Obstetrics and Gynecology, Emory University School of Medicine, Atlanta, Ga.

Discussion. WALTER CLARKE, M.B., Director, Division of Medical Measures, American Social Hygiene Association, New York, N. Y.

PUBLIC HEALTH ENGINEERING SECTION AND THE CENTRAL STATES SEWAGE WORKS ASSOCIATION

Joint Session—Riley Room

Presiding: C. K. CALVERT, *Chairman,* Central States Sewage Works Association.

Recent **Advances in the Chemical Treatment of Sewage.** F. W. MOHLMAN, Director of Laboratories, Sanitary District of Chicago, Chicago, Ill.

Sewage **Sludge Gas Utilization.** C. E. KEEFER, Bureau of Sewers, Department of Public Works, Baltimore, Md.

Mechanization of **Sewage Treatment Works.** E. B. BESSELIEVRE, Sanitary Engineer, The Dorr Company, New York, N. Y.

The **Treatment of Trade Wastes.** L. F. WARRICK, State Sanitary Engineer, State Board of Health, Madison, Wis.

VITAL STATISTICS

Third Session—Empire Room

The **Economic Depression and Health and Sickness in Families of the Unemployed in Ten Cities.** G. ST. J. PERROTT, Consultant, and SELWYN D. COLLINS, PH.D., Senior Statistician, U. S. Public Health Service, Washington, D. C.

Have **You Used Your 1930 Census Data to the Fullest Extent?** MARY V. DEMPSEY, Washington, D. C.

Brief **Announcements of Recent Work and Problems.**

Display of a Convenient Cumulative Index to U. S. Vital Statistics. J. V. DEPORTE, PH.D., Director, Division of Vital Statistics, State Department of Health, Albany, N. Y.

Thursday, 9:30 A.M.

VITAL STATISTICS (Cont.)

Third Session—Empire Room

Some Adventures as a Registration Consultant in Roumania. W. THURBER FALES, SC.D., State Registrar, State Board of Health, Montgomery, Ala.

Residence Allocation Studies in Ohio. P. G. BECK, University of Ohio, Columbus, O.

Occupational Mortality. JESSAMINE S. WHITNEY, Statistician, National Tuberculosis Association, New York, N. Y.

A Post-mortem of the 1933 Vital Statistics Meetings. Suggestions for Future Programs.

Discussion opened by: GEORGE H. VAN BUREN, Supervisor, Statistical Bureau, Metropolitan Life Insurance Company, New York, N. Y.

Thursday, 2:30 P.M.

LABORATORY

Fifth Session—Sanitation Sub-Session—Chateau Room

WATER AND SEWAGE

Presiding: M. H. MCCRADY, Chief of Laboratories, Provincial Bureau of Health, Montreal, Que.

Differential Reactions in the Colon Group of Bacteria. MAX LEVINE, PH.D., S. S. EPSTEIN, and R. H. VAUGHN, Department of Bacteriology, Iowa State College, Ames, Ia.

Open Forum on Standard Methods for Detection of Members of Coli-Aerogenes Groups of Organisms in Water.

Discussion Opened by: C.-E. A. WINSLOW, DR.P.H., Yale University, New Haven, Conn.

Some Observations on the Germicidal Efficiency of Chloramine-T. D. B. CHARLTON and MAX LEVINE, PH.D., Department of Bacteriology, Iowa State College, Ames, Ia.

INDUSTRIAL HYGIENE

Third Session—Club Room

Occupational Disease Legislation. ANDREW J. FARRELL, Attorney-at-Law, Chicago, Ill.

Pulmonary Asbestosis. JOHN DONNELLY, M.D., Superintendent, Mecklenburg Sanatorium, Huntersville, N. C.

Flight Fatigue. WADE HAMPTON MILLER, M.D., Medical Examiner, Department of Commerce, Aeronautics Branch, Lieutenant Commander, Medical Corps, U. S. Naval Reserve, Flight Surgeon, Kansas City, Mo.

Thorium as a Hazard in Roentgenology. R. POMERANZ, M.D., Associate Roentgenologist, Beth Israel Hospital, Newark, N. J.

A New X-Ray Mass-Procedure for the Discovery of Early Tuberculosis in Industry. MARGARET W. BARNARD, M.D., Medical Director, Bellevue-Yorkville Health Demonstration, New York, N. Y.

Thursday, 2:30 P.M.

FOOD AND NUTRITION SECTION AND INTERNATIONAL ASSOCIATION OF DAIRY AND MILK INSPECTORS

Joint Session—Riley Room

Presiding: CARL R. FELLERS, PH.D., *Chairman,* Food and Nutrition Section, and HORATIO N. PARKER, *President,* International Association of Dairy and Milk Inspectors.

Natural and Induced Variations in the Vitamin Values of Milk. PROFESSOR HENRY C. SHERMAN, Department of Chemistry, Columbia University, New York, N. Y.

Report of the **Committee on Food Value of Milk** (International Association of Dairy and Milk Inspectors). IRA V. HISCOCK, Professor of Public Health, Yale University, New Haven, Conn.

Report of the **Committee on Inter-state Shipment of Cream** (International Association of Dairy and Milk Inspectors). H. E. BREMER, State Department of Agriculture, Montpelier, Vt.

Report of the **Committee on Milk and Dairy Products** (American Public Health Association). *Chairman,* WILLIAM B. PALMER, Milk Inspection Association of the Oranges, Orange, N. J.

The **Quality of Milk Pasteurized by High-Temperature, Short-Time and 30-Minute Holding Methods.** M. W. YALE, PH.D., New York State Agricultural Experiment Station, Geneva, N. Y.

Chlorine Sterilizers in Dairies (International Association of Dairy and Milk Inspectors). M. J. PRUCHA, PH.D., Professor of Dairy Bacteriology, University of Illinois, Urbana, Ill.

PUBLIC HEALTH EDUCATION

Third Session—Travertine Room, Lincoln Hotel

IS THERE A COMMON OBJECTIVE IN PUBLIC EDUCATION AROUND WHICH ALL HEALTH ORGANIZATIONS CAN RALLY?

A Panel Session.

Foreman of the Jury: C.-E. A. WINSLOW, DR.P.H., Yale University, New Haven, Conn.

Jurymen:

H. E. KLEINSCHMIDT, M.D., Director, Health Education, National Tuberculosis Association, New York, N. Y.

LEWIS H. CARRIS, Managing Director, National Society for the Prevention of Blindness, New York, N. Y.

WILLIAM F. SNOW, M.D., General Director, American Social Hygiene Association, New York, N. Y.

HAVEN EMERSON, M.D., Department of Public Health Administration, Columbia University, New York, N. Y.

MARJORIE DELAVAN, Director, Bureau of Education, State Department of Health, Lansing, Mich.

BLEECKER MARQUETTE, Executive Secretary, Public Health Federation, Cincinnati, O.

Thursday, 2:30 P.M.

PUBLIC HEALTH NURSING SECTION, INDIANA STATE NURSES ASSOCIATION AND INDIANA LEAGUE OF NURSING EDUCATION

Joint Session—Assembly Room

Presiding: BEATRICE GERRIN, R.N., Superintendent of Nurses, Indianapolis City Hospital Nursing School, Indianapolis, Ind., and ELSBETH H. VAUGHAN, R.N., *Chairman,* Public Health Nursing Section.

QUALITY NURSING

Good Health as a Factor. JOHN SUNDWALL, M.D., Director, Division of Hygiene and Public Health, University of Michigan, Ann Arbor, Mich.

Discussion.

The Undergraduate Curriculum as a Factor. MARY BEARD, R.N., Associate Director, International Health Division, Rockefeller Foundation, New York, N. Y.

Discussion.

THE SECOND INSTITUTE ON HEALTH EDUCATION

DR. IAGO GALDSTON, *Director*

Under the auspices of the Public Health Education Section

Theme: "The Psychology of Health Education."

Arrangement: There will be five sessions; Saturday morning, Saturday afternoon, Sunday morning, Sunday afternoon and Monday morning. Morning sessions begin at 9 and end at 12; afternoon sessions begin at 2 and end at 5. Three of the sessions will be didactic conferences concerning:

a. **Why the psychology of health education?**

b. **The psychologic nature of the recipient of health education**

c. **Fundamental principles relative to:**

1. Arresting attention
2. Enlisting sympathy
3. Imparting information

d. **Meaning and mechanism of motivation**

e. **Practical demonstrations; the application of the outline of psychologic principles to health education instruments; the spoken text, the printed text and graphic material.**

Round Table, Clinic: One session will be a "round table" with the student body forming three separate groups. The students will be given an opportunity to practise evaluating material which they as a body have brought, along principles indicated. Each group will hold a conference on a definite amount of assigned material. Each group will have a reporter who will deliver to the student body as a whole the judgment of the round table at the final clinic session. The reporters will participate with the teaching staff in evaluating the educational material submitted.

Teaching Staff: The teaching staff consists of Dr. IAGO GALDSTON, New York Academy of Medicine, Dr. H. E. KLEINSCHMIDT, National Tuberculosis Association, BERTRAND BROWN, Milbank Memorial Fund, *and the student body.*

Enrollment: Any person engaged full time or part time in health education activities is eligible for enrollment in the Institute, upon application to the office of the American Public Health Association and upon payment of the Institute fee of $5.00. The Institute faculty reserves the right to limit enrollments to sixty, applications to be accepted in the order received. Every participant in the Institute will be required to submit educational material for review and analysis. Such material may be finished pieces of work or lay-outs and plans in preparation.

MEETINGS OF OTHER ORGANIZATIONS

CONFERENCE OF STATE SANITARY ENGINEERS

All day Saturday, October 7, Palm Room.
Monday A.M., Palm Room.
Monday P.M., Joint Session with the Public Health Engineering Section, Palm Room.
Tuesday Evening, Annual Engineers' Stag Dinner Party, Travertine Room, Lincoln Hotel.

AMERICAN ASSOCIATION OF SCHOOL PHYSICIANS

For complete program see pages 970 and 971.

MUNICIPAL SANITATION EDITORIAL BOARD

Monday Noon, Luncheon, English Parlor.

ASSOCIATION OF WOMEN IN PUBLIC HEALTH

Monday Evening, Dinner Session, Chateau Room

The Annual informal dinner of the Association of Women in Public Health will occur October 9, 1933, at the Claypool Hotel in the Chateau Room.

Detailed information will be available at the registration desk.

It is hoped that members arriving early for sessions of the American Public Health Association will visit the Florentine Room in the Claypool Hotel, where the organization will have informal headquarters. There are a number of important questions to be discussed and formulated for presentation at the dinner meeting.

A committee on future policies and plans, Dr. Mary Lakeman, Chairman, will be glad to have your suggestions, as will the nominating committee.

Officers of the Association aided by a local committee will give all possible assistance.

You are asked to obtain your dinner ticket at the A.P.H.A. registration desk, on your arrival, to facilitate arrangements. As members will wish to attend the First General Session of the American Public Health Association, it will be necessary to arrive promptly at the hour given on the card. A pleasant surprise is planned for the dinner.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Tuesday, 8 A.M., Breakfast, Louis XV Parlor.

DELTA OMEGA

NATIONAL COMMITTEE OF HEALTH COUNCIL EXECUTIVES

Tuesday Noon, Luncheon, English Parlor.

JOHNS HOPKINS UNIVERSITY ALUMNI

Wednesday, 8 A.M., Breakfast.

AMERICAN SOCIAL HYGIENE ASSOCIATION

Thursday A.M., Joint Session with the Child Hygiene Section and American Association of School Physicians, Chateau Room.

CENTRAL STATES SEWAGE WORKS ASSOCIATION

Thursday A.M., Joint Session with the Public Health Engineering Section, Riley Room.

INTERNATIONAL ASSOCIATION OF DAIRY AND MILK INSPECTORS

Thursday P.M., Joint Session with the Food and Nutrition Section, Riley Room.

Friday and Saturday, October 13 and 14.

INTERNATIONAL SOCIETY OF MEDICAL HEALTH OFFICERS

SIXTH ANNUAL MEETING
AMERICAN ASSOCIATION OF SCHOOL PHYSICIANS

(Unless otherwise indicated, all sessions will be held in the Roof Garden of the Hotel Severin)

Monday, 9:30 A.M.

Joint Session with the Public Health Nursing and Child Hygiene Sections of the American Public Health Association

Riley Room, Claypool Hotel

(For Program see page 951)

Monday, 2:00 P.M.

AMERICAN ASSOCIATION OF SCHOOL PHYSICIANS

Address of the President of the American Association of School Physicians. J. BRUCE MCCREARY, M.D., Deputy State Secretary of Health, Harrisburg, Pa.

MEDICAL LEADERSHIP IN HEALTH SERVICE

By State Medical Societies. R. R. FERGUSON, M.D., Illinois State Medical Society, Chicago, Ill., and THOMAS P. FARMER, M.D., New York State Medical Society, Syracuse, N. Y.

By Educational Authorities. A. O. DEWEESE, M.D., Director of Health, Kent State Normal College, Kent, O., and W. D. GATCH, M.D., Indiana University School of Medicine, Indianapolis, Ind.

What Qualifications Should the Director of School Health Education and School Health Service Have? FREDERICK L. PATRY, M.D., Neuropsychiatrist, State Education Department, Albany, N. Y.

Discussion. JOHN SUNDWALL, M.D., University of Michigan, Ann Arbor, Mich.

Tuesday, 12:15 P.M.

AMERICAN ASSOCIATION OF SCHOOL PHYSICIANS AND INTERNATIONAL SOCIETY OF MEDICAL HEALTH OFFICERS

Joint Luncheon Session

A Close-Up of Some Aspects of School Medical Inspection (A Preliminary statement on the results of a study of physical defects and the reasons for non-correction in the schools in New York City). RAYMOND FRANZEN, PH.D., Research Director of the Study, American Child Health Association, New York, N. Y.

Discussion. HAVEN EMERSON, M.D., Member of Advisory Committee of the Study, New York, N. Y.

Tuesday, 2:00 P.M.

AMERICAN ASSOCIATION OF SCHOOL PHYSICIANS

SCHOOL MEDICAL INSPECTION AND HEALTH SERVICE

In Honolulu. FRED K. LAM, M.D., Honolulu, T. H.

In LaSalle, Illinois. ARLINGTON AILES, M.D., Hygienic Institute, LaSalle, Ill.

Annual Medical Examination for Teachers. J. L. DELAMATER, M.D., St. Joseph, Mo., and H. W. FUDGE, M.D., Elmira, N. Y.

Mental Hygiene Child Guidance by a Part-Time Psychiatrist. HAROLD S. HULBERT, M.D., School Psychiatrist for Gary and East Chicago, Ind.

Prevalence and the Permanence of Defective Hearing as It Exists in School Children. WALTER S. CORNELL, M.D., Director of Medical Inspection, Philadelphia, Pa.

Wednesday, 2:00 P.M.

AMERICAN ASSOCIATION OF SCHOOL PHYSICIANS AND INTERNATIONAL SOCIETY OF MEDICAL HEALTH OFFICERS

Joint Session

Childhood Tuberculosis Up to Now. J. A. MYERS, M.D., Department of Public Health, Minneapolis, Minn., and WALTER RATHBUN, M.D., Cassadaga, N. Y.

Discussion. JAMES A. KEENAN, Boston, Mass.

State Chapters of American Association of School Physicians. J. M. QUIGLEY, M.D., Clearfield, Pa.

The Factor Body Width Plays in Height, Weight, Age (Preliminary Report). C. L. OUTLAND, M.D., School Medical Director, Richmond, Va.

Thursday, 9:30 A.M.

AMERICAN ASSOCIATION OF SCHOOL PHYSICIANS

Joint session with the Child Hygiene Section of the American Public Health Association and the American Social Hygiene Association.

Travertine Room, Lincoln Hotel

(For Program see page 965)

INDIANA STATE NURSES ASSOCIATION AND INDIANA LEAGUE OF NURSING EDUCATION

The program for these meetings, to be held on October 12, 13, and 14, lists some interesting topics and speakers.

Their joint session on Thursday afternoon with the Public Health Nursing Section is given on page 968 of this JOURNAL. The subject of the General Session on Friday morning is "Quality Nursing." It will be treated from three angles—the hospital, the public health field, and the home. GRACE ROSS, Director of Nursing Service of the Detroit Department of Health, will speak for the public health nurse.

One of the round table luncheons scheduled for Thursday noon will be presided over by BEATRICE SHORT, *Chairman* of the Public Health Section. The topic for discussion is "What Can Be Done Next Year in Indiana to Further the Interest of Public Health Nurses as a Professional Group?" ALMA HAUPT, Associate Director, National Organization for Public Health Nursing, will present the paper.

At the general session on Friday afternoon, DR. J. A. MEYERS will talk on "Tuberculosis Case Finding," and DR. FRANK L. RECTOR on "Cancer." At a dinner that evening, CLARA D. NOYES, Director of the Nursing Service, American Red Cross, is to be the speaker.

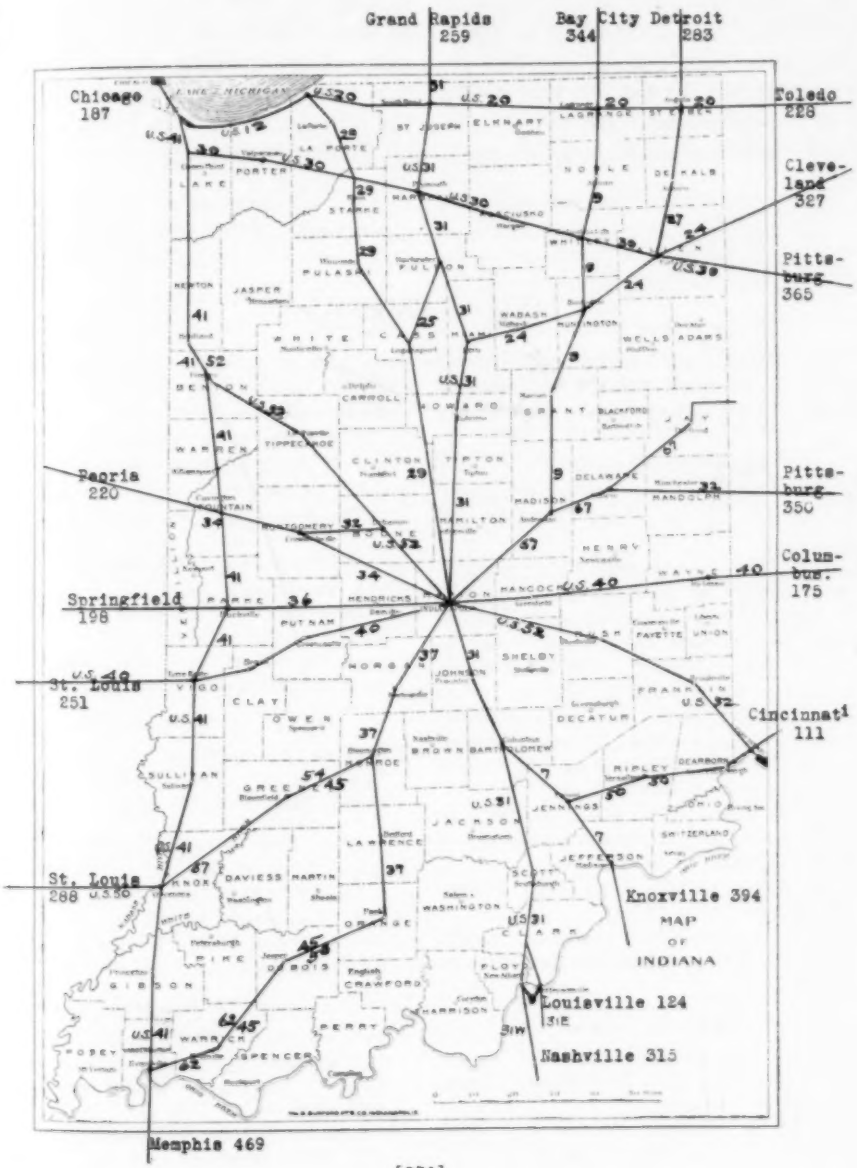
Saturday morning will be taken up with committee and section reports and an address on "Present Problems and Needs of Indiana" by the President of the Indiana State Nurses' Association, LULU V. CLINE.

Members of the American Public Health Association are invited to attend the sessions.

ASSOCIATION NEWS

Main Indiana Highways to Indianapolis with road numbers indicated

MARGIN FIGURES INDICATE MILEAGES FROM INDIANAPOLIS



DID YOU ATTEND THE INDIANAPOLIS ANNUAL MEETING IN 1900?

ONE of the outstanding events of our Indianapolis meeting this year, as has been mentioned before, is the Memorial Session to Dr. Walter Reed and his associates on the Yellow Fever Commission.

Dr. William F. King, our host at Indianapolis, is assembling a list of present members of the Association who attended the Annual Meeting in 1900. Letters have been sent to members on the membership list for the year 1900; but it is possible that the old records are not entirely accurate and that some who are members now and were present at the meeting when Dr. Reed read his famous paper joined after that year.

If you attended the Indianapolis Annual Meeting in 1900, please notify the Association office. Any memories you have of the occasion will be helpful, particularly if you were so fortunate as to hear Dr. Reed. If you are planning to attend the Indianapolis meeting this year, please indicate that as well, so you may be paid some honor, too, when the Association meets in banquet session on Wednesday evening, October 11.

NEW MEMBERS

The following list includes applicants who have been approved for membership in the A.P.H.A. by the Sub-Committee on Eligibility. These new members have requested affiliation with the sections indicated, and action by the Section Councils will follow.

Health Officers Section

Joseph F. Bredeck, M.D., D.P.H., Municipal Courts Bldg., St. Louis, Mo., Health Commissioner

Claude W. Chamberlain, Ph.D., 6124 Cermak Road, Cicero, Ill., Assistant Superintendent of Social Hygiene, Division of Communicable Diseases, State Department of Health

Francis B. Galbraith, M.D., 2226 Santa Clara Ave., Alameda, Calif., Health Officer

Verne K. Harvey, M.D., C.P.H., State House Annex, Indianapolis, Ind., Director, Division of Public Health, Indiana State Department of Commerce and Industry

William H. Oates, B.Sc., M.D., 402-1st National Bank Annex, Mobile, Ala., Member of Board of Health of Mobile County

Tan Poh Seong, M.D.H., Kuala Belait, Brunei, S. S., Health Officer (Assoc.)

George L. Stivers, M.D., Belmont Hospital, Worcester, Mass., Medical Director, Belmont Hospital

Laboratory Section

Chester S. Bowers, B.S., Board of Health Laboratory, City Hall, New Britain, Conn., Director of Laboratory

Harold M. B. Lineback, M.S. in P.H., 1537 Cone St., Toledo, Ohio, Bacteriologist

Vital Statistics Section

Ruth R. Puffer, A.B., State Department of Health, Nashville, Tenn., Statistician

Public Health Engineering Section

J. G. Beacham, B.S.C.E., P. O. Box 522, Athens, Ga., City Engineer and Superintendent of Water Works

Charles G. Gifford, M.S., 203 Standard Life Bldg., Pittsburgh, Pa., Dairy Inspector

Food and Nutrition Section

Harry A. Fritschman, 2325 Darby Road, Upper Darby, Pa., Secretary Board of Health, Haverford Township

Child Hygiene Section

Solomon L. Hermany, M.D., Bowmanstown, Carbon Co., Pa., School Medical Inspector, Palmerton Public Schools

Harry J. Wieler, M.A., The Hotchkiss School, Lakeville, Conn., Medical Director

Public Health Education Section

Elwood C. Davis, Ph.D., Pennsylvania State College, State College, Pa., Head of Department of Professional Health and Physical Education

Margaret H. Jeffreys, 2 Walnut St., Crafton, Pa., Dental Hygienist

George T. Wilhelm, University of Tennessee, Knoxville, Tenn., Professor of Hygiene and Director, Department of Student Health
Frank B. Wisner, B.S., M.D., Springfield Hospital, Springfield, Mass., Student (Assoc.)

Public Health Nursing Section

Emma T. Higgins, R.N., P. O. Box 195, Waukesha, Wis., County Nurse
Clodia E. Johnson, R.N., Hart, Mich., County Nurse
Maude D. Smith, R.N., 969 N. Marengo Ave., Pasadena, Calif., School Nurse
Reba L. Bess, R.N., Box 645, Keyser, W. Va., County Nurse

Epidemiology Section

W. Arkell Browne, M.D., 416 City Hall Annex, Richmond, Va., Epidemiologist, Bureau of Health

Unaffiliated

Charles W. Bonynge, M.D., 840 W. 37th St., Los Angeles, Calif., Director Laboratories, Los Angeles County Medical Commission
Raymond D. Fear, M.D., Dr.P.H., 52 South St., Stamford, Conn., Health Commissioner
Arthur E. McClue, M.D., State Health Dept., Charleston, W. Va., State Health Commissioner

ADDITIONAL APPLICANTS FOR FELLOWSHIP

HEALTH OFFICERS SECTION

James William Bass, M.D., Dallas, Texas
Lloyd Moffitt, M.D., Yakima, Wash.

LABORATORY SECTION

George D. Beal, Phar.D., Ph.D., Pittsburgh, Pa.
Archie H. Robertson, M.S., Ph.D., Albany, N. Y.

FOOD AND NUTRITION SECTION

Lawrence W. Bass, Ph.D., New York, N. Y.
Francis Lowell Burnett, M.D., Boston, Mass.
Ray William Clough, Ph.D., Seattle, Wash.
Merrick J. Mack, Amherst, Mass.
Harry W. von Loesecke, B.S., Winter Haven, Fla.

PUBLIC HEALTH ENGINEERING SECTION

Warren H. Booker, C.E., Raleigh, N. C.
Levi L. Hedgepeth, B.S., Philadelphia, Pa.
J. R. Jennings, B.S., Louisville, Ky.

PUBLIC HEALTH EDUCATION SECTION

Katherine Z. W. Whipple, A.M., New York, N. Y.

PUBLIC HEALTH NURSING SECTION

Sarah R. Addison, R.N., Hartford, Conn.
Naomi Deutsch, R.N., San Francisco, Calif.
Mary E. Edgecomb, Englewood, N. J.
Alma C. Haupt, R.N., New York, N. Y.
Arline R. Mansfield, B.S., Easton, Pa.
Marion W. Sheahan, R.N., Albany, N. Y.

PUBLIC HEALTH ADMINISTRATION

Dairy and Milk Inspectors' Training Course—The growing interest in self-improvement developed by sanitary inspectors of the Los Angeles County Health Department has arrived at the point where they are willing to spend their own time and mileage allowance attending classes of instruction. This was evidenced by the attendance at the Dairy and Milk Inspectors' Training Course given under the supervision of the School of Sanitary Instruction from February 7 to May 23, 1933. Classes were held every Tuesday evening from seven to nine at the East Side Health and Welfare Center, with the exception of three weeks when the entire inspection group was on earthquake emergency duty. Field trips were taken in the evenings or on Saturdays. The scope of the course was limited to the actual operations which a dairy and milk inspector performs, the contributing knowledge being distributed in pamphlet form.

The object of the training program was (1) to standardize procedure, (2) prepare inspectors to pass the approval examination given by the State Department of Agriculture, and (3) for general information. There were nine dairy and milk inspectors and eighteen senior sanitary inspectors who attended classes, twenty-two of whom completed the course and took the final oral and written examination. In addition to the regular class, there were twelve to twenty-eight visitors at each session, the latter merely listening in and taking no part in the discussions, five minute questions, or home work. Some of the inspectors and visitors had to travel a total distance of seventy miles to the Health Center which was a good indication of their interest. This getting-together of inspectors with state control officials has proven of immense benefit in clarifying dairy inspection procedure and in developing a high morale within the inspection force (a complete list of the subjects discussed will be provided upon request).—Walter S. Mangold, Sanitary Instructor, Los Angeles County Health Department.

Distribution of Dysentery—To distinguish this disease from the common intestinal affections the dysenteric syndrome is defined as being constituted essentially by the presence of abdominal pains, frequent mucous and bloody stools with painful straining and tenesmus. This syndrome may be produced by infection either by *Entamoeba histolytica* or by one of the numerous known forms of *B. dysenteriae*. In the search for amoebiasis a single examination cannot prove with certainty the absence or presence of the amoeba. A single examination may disclose only 44 per cent of carriers while as many as six examinations may be required to uncover 100 per cent of carriers.

A statistical study has been made of the prevalence of dysentery in all sections of the world. Statistics have been gathered from registered cases, from death records, from military and hospital records and other sources. Dysentery appears even in places with a severe climate. For a long time it was thought that amoebic dysentery was the dominating, if not the only, form encountered in the tropical and sub-tropical zones, and that, on the other hand, bacillary dysentery was the only form that occurred in the temperate zones. The increasing use of laboratory methods for the etiological diag-

nosis of the forms of dysentery, and for finding germ carriers, has brought about a change in these traditions. Amoebic dysentery is particularly prevalent in tropical regions but to a lesser degree the *Entamoeba histolytica* is widespread in temperate climates. Bacillary dysentery is not limited to the temperate zone but may even be the predominant type of infection in tropical regions.—*League of Nations Epidemiological Report*, Apr., 1933.

Bellevue-Yorkville Health District—The sixth annual report of the Bellevue-Yorkville health demonstration for 1932 is a document of 68 pages, well mimeographed and interestingly written. The health department's first clinic for preschool children was opened here in 1927, later followed by similar services elsewhere in the city. The first official consultation chest service for private physicians was established in 1929 and the department now operates seven others. A pneumothorax refill service, established in the health center in 1931, has been extended to other sections of the city. A diagnostic cardiac clinic for children, a generalized nursing service, a mental hygiene unit, and a dental service for children are among the other projects which are described.

Of recognized value, too, are the quarterly and yearly compilations and special studies, prepared by the Demonstration's division of records, of vital statistics for the 25 sanitary areas comprising its district. A record of the prevalence of diseases, so localized, makes possible greater efficiency in the direction of preventive activity by the Center.

Health education applying to adults as well as children, living or working in the area has been a feature of the health center work. Expenditures of the Demonstration, besides those of the department of health for medical nursing services, amounted to $81,647, which was contributed by the Milbank Memorial Fund.

Whooping Cough Vaccination—Many authorities feel that if vaccine is given early in the catarrhal stage some good will be effected but when used in the convulsive stage little effect can be expected. There has not been sufficient distinction between the use of whooping cough vaccination for therapeutic and prophylactic purposes. The Faroe Islands, due to their isolation, have long afforded a splendid opportunity for the study of the epidemiology of communicable diseases. Favorable results with vaccination are reported. The vaccine used was made from young strains; the dose was rather large, a total of 22,000 million bacteria; the vaccination was completed shortly before the onset of an epidemic. The mortality in the vaccinated group of nearly 4,000 individuals was but one-sixteenth of the mortality in the non-vaccinated group which included approximately 1,000 individuals. The groups were quite comparable with respect to age, time of epidemic and surrounding conditions. — Thorvald Madsen, Vaccination Against Whooping Cough, *J.A.M.A.* 101, 189 (July 15), 1933.

LABORATORY

LABORATORY AIDS IN THE DIAGNOSIS AND SERUM THERAPY OF PNEUMOCOCCUS PNEUMONIA

ALBERT B. SABIN, M.D.

Department of Bacteriology and Immunology, New York University and Bellevue Hospital Medical College, New York, N. Y.

FOR centuries the diagnosis of pneumonia has been made on the basis of certain well known clinical features. However, from the standpoint of prognosis, serum therapy, and epidemiology, the simple clinical diagnosis of pneumonia with its anatomic differentiation into lobar and broncho-pneumonia, has come to be regarded as incomplete without the determination of the etiologic agent. We present recent methods for establishing the etiologic diagnosis and discuss laboratory aids for the control of serum therapy.

Of the pneumococci which are the infecting organisms in about 95 per cent of the pneumonias, approximately 90 per cent fall into 32 distinct and definite types.[1] Of the specific antisera which have thus far been investigated, only Type I serum has been shown to be of definite value, and Type II to have a beneficial effect when administered during the first 3 days of the disease. The value of sera against some of the recently classified types is being studied. Although specific therapy is thus limited, it is nevertheless important to carry routine determinations through all the classified types of pneumococci, not only as an aid to prognosis, but also, epidemiologically, to supply data as to the relative incidence of the various types in different parts of the world. For this latter reason it would also be advisable to make pneumonia reportable not merely as "lobar" or "broncho"—but with a complete etiologic diagnosis as well.

The determination of the infecting organism may be accomplished in four ways: (1) by the isolation of the organism; (2) by the demonstration in sputum, urine, or blood of the specific products of its growth; (3) by the rate of agglutinin neutralization in cases receiving polyvalent serum; and (4) by the specific immune bodies which the patient develops during convalescence.* The isolation of the organism is commonly attempted from the blood by culture, and from the sputum preferably by mouse inoculation. When, as in certain adult patients, and particularly in children, sputum cannot be obtained, one may incubate a throat swab in broth for 2–3 hours, and then inject the broth into a mouse. Although many reliable methods for typing pneumococci have been introduced, I shall confine myself to the microscopic method which I described in 1929[2]; it has since been widely used and found to be rapid, reliable, and particularly useful in the differentiation of all known types of pneumococci on account of the small quantities of antigen and serum required.

The method is as follows: Three to 4 hours after mouse inoculation with a good sample of sputum there are usually sufficient pneumococci in the peritoneal

* Since this paper was read in October, 1932, a method of pneumococcus typing directly from the sputum has been introduced and found to be perhaps the most rapid, simple, and practical of any employed thus far.

Sabin, A. B. Immediate Pneumococcus Typing Directly from Sputum by the Neufeld Reaction. *J.A.M.A.*, 100:1584–1586 (May 20), 1933.

exudate to permit a microscopic test. The mouse is not killed, the exudate being drawn off with a glass capillary tube. Drops of the exudate are mixed with drops of a 1:10 dilution of the various typing sera; after drying, the smears are stained and examined with the oil immersion lens. A positive reaction is indicated by a clumping of the pneumococci in one of the smears (Figure 1). In performing a complete typing for all the 32 types, the sera may be combined into 8 groups; for example, Group A may contain the sera of Types I–IV in final dilution of 1:10 or 1:20; Group B, sera Types V–VIII, etc. When agglutination occurs in one of the groups, 4 smears are made with the constituent sera of that group, to determine the one type; with no clumping in any of the groups, the pneumococcus is termed unclassified. Sometimes, agglutination is observed in more than one group or type serum, and it is then necessary to repeat smears with higher dilutions (1:20, 1:40, 1:60, etc.) of the sera in question, until only one serum produces agglutination. After death of the mouse it is well to confirm the type by a culture of the heart's blood. When, as occasionally happens, more than one type of pneumococcus is isolated, it is important to keep the cultures until the patient convalesces, if he does, and then test the patient's blood against these cultures; the type that is agglutinated by the patient's blood is the one that most likely was the infecting organism. Only when more than one is specifically agglutinated by the convalescent blood, is a mixed infection definitely established.

When sufficient sputum is available, and if it is coagulable, in addition to mouse inoculation a Krumwiede test should be tried, since when it is definitely positive it is the most rapid and reliable of all methods. In severe cases it is worth while to do a precipitin test on a clear sample of urine.

Microscopic Typing of Blood Cultures—If the growth is not sufficiently heavy in the original culture, the broth is centrifuged, and the sedimented organisms then suspended in a little of the supernatant fluid. Typing is performed with this suspension.

Microscopic Typing of Spinal and other Pneumococcus-Infected Fluids—In pneumococcus meningitis, there are

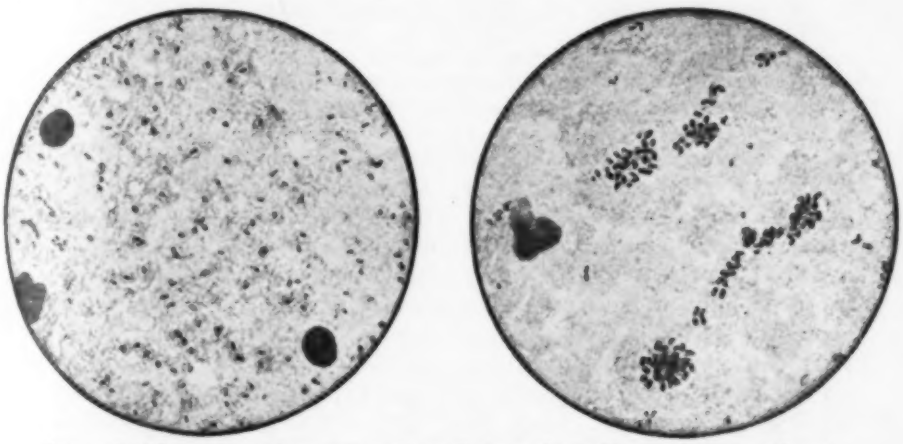


FIGURE 1—MICROSCOPIC AGGLUTINATION IN STAINED SLIDE TYPING METHOD (SABIN). (*Left*) Mouse peritoneal exudate mixed with heterologous type serum. No agglutination of pneumococci; (*Right*) Same mixed with homologous type serum. Observe agglutination of pneumococci.

Acknowledgment: The author is indebted to Dr. Jesse G. M. Bullowa for the use of these figures.

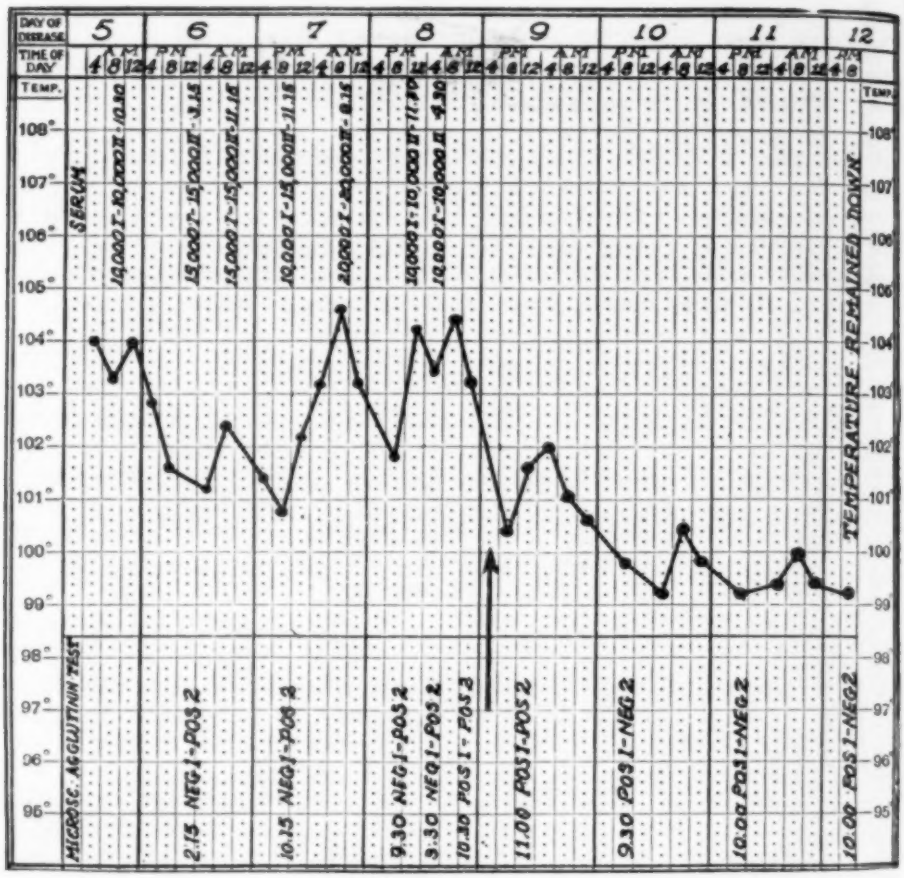


CHART 1—Reaction of a patient with Type I pneumonia (negative blood culture) to serum therapy; neg 1—pos 2 refers to the absence of Type I and the presence of Type II pneumococcus agglutinins in the patient's blood at the time indicated; pos 1—pos 2 refers to the presence of both; 10,000 I, 10,000 II indicates the number of units of Type II and of Type II protective antibody contained in the dose of polyvalent serum.

usually sufficient organisms in the spinal fluid to permit a direct typing by microscopic agglutination, and sometimes by precipitation; otherwise a mouse is injected. With other pneumococcus-infected fluids, the same procedures are used.

The rate of agglutinin neutralization offers a method for determining the type of infecting pneumococcus which although of limited applicability, may be very useful in many instances. It depends upon the observation made by Cole,[3] that homologous antibody injected into a pneumococcus-infected animal disappears rapidly, whereas heterologous antibody disappears as in a non-infected animal. It thus appears that if a bivalent (Types I and II) antipneumococcic serum were injected into a patient with an active Type I pneumococcus pneumonia, the Type I antibody should disappear more rapidly than Type II. That this is actually so became evident from the agglutinin studies on many patients.[4] Two characteristic cases are shown in Charts I and II. The patients were injected with the bivalent serum and at stated intervals thereafter the presence or absence of agglutinins

in their blood was determined by a rapid microscopic method.[4] In this method two drops of blood are obtained on a slide; one is mixed with a drop of Type I pneumococcus vaccine, and the other with a drop of Type II vaccine. After drying in air, the smears are dehemoglobinized and fixed by immersion into Ruge's solution (2 per cent formaldehyde containing 1 per cent glacial acetic acid) for 20 seconds. After rinsing in water, the preparation is stained. An analysis of Charts I and II reveals that even in the absence of a detectible bacteremia, there is a continued disappearance of the homologous agglutinins until an excess is established in the circulation. It thus appears that this method can be used not only for confirming the type of infecting pneumococcus but also primarily to establish it. In many communities, where 50–60 per cent of all pneumonias are caused by pneumococcus Types I and II, and in the absence of facilities for a rapid determination of type, it seems advisable to administer a certain amount of bivalent (Types I and II) antipneumococcic serum and 2–3 hours later to perform an agglutination test with the patient's blood. When the infecting pneumococcus is neither Type I nor II, the blood will contain both Type I and II agglutinins; the presence of Type II agglutinins only indicates a Type I infection and *vice versa*. Since the rapid disappearance of homologous agglutinins depends upon the activity of the infection, a very mild infection may not be detected by this method. Similarly, late in the disease, sometimes even a day or two before the crisis, the patient will have produced his own homologous agglutinins, which persist long after the passively introduced heterologous agglutinins have disappeared.

It is of course obvious that the use of this method either for the confirmation or the primary establishment of the type of infection cannot properly be carried out unless the respective agglutinin titres of the bivalent serum are known. Table I shows the agglutinin titres of five concentrated and refined

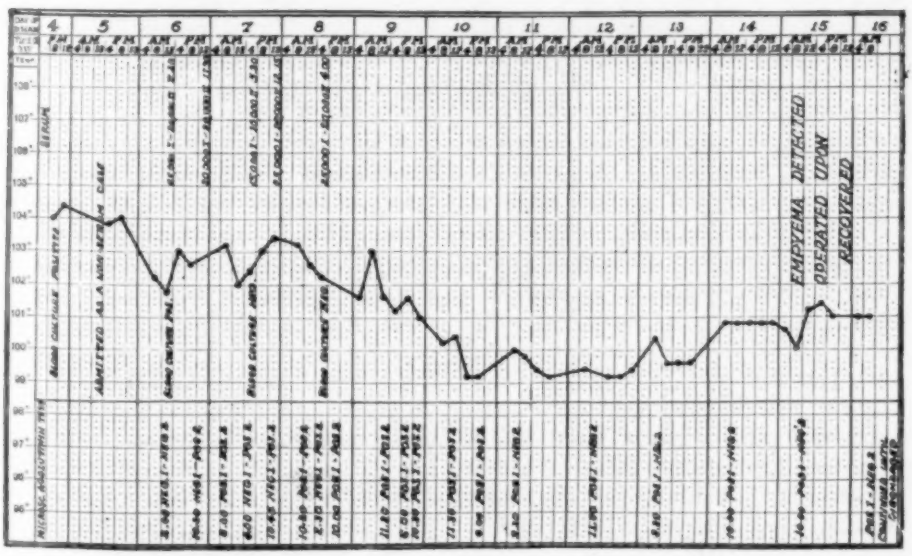


CHART 2—Reaction of a patient with Type I pneumonia (positive blood culture) to serum therapy.

TABLE I

RELATIONSHIP BETWEEN THE CONTENT OF "PROTECTIVE ANTIBODIES" AND AGGLUTININS IN CONCENTRATED SERA

Concentrated Preparation	Protective Units per c.c.		Agglutination of Undiluted Serum with Pneumococcus Type			Last Dilution (Using Horse Serum) Giving Positive Agglutination of Pneumococcus Type	
	I	II	I	II	III	I	II
Banzhaf 14-485	< 20	1,000	+	—	+	....	1,000
Banzhaf 36	< 20	2,000	+	—	+	....	1,200
Lederle	3,000	1,500	—	—	+	800	1,000
Felton 37	1,500	1,000	—	—	+	400	400
Felton 39	2,000	1,000	—	—	+	400	400
Felton 45B	3,000	1,500	—	—	+	800	1,200
Felton 47	3,000	1,000	—	—	+	1,200	1,400

bivalent sera (Types I and II). The important thing to note is the disproportion between the number of mouse protective units and the agglutinin titres for the two types of antibody, and the relatively higher agglutinin content per mouse protective unit of the Type II antibody. The dose of serum which is administered must necessarily contain sufficient agglutinins to render them detectible after their dilution with the body fluids; however, in making this calculation, it has been shown that human blood increases the agglutinin titre of a serum about 2–3 times by a so-called conglutinin effect.[4]

The proper control of the dosage of antipneumococcic serum necessarily depends upon a correct understanding of its therapeutic mechanism. The current opinion is that the action of the serum is purely antibacterial, and that its potency can be correctly expressed in terms of its mouse protective capacity. Recently,[5] I have been able to show that in addition to the antibacterial bodies, standard antipneumococcic sera contain also a so-called "non-antibacterial" factor which plays an important rôle in the defense against pneumococcus infection. It was apparent from this that the standardization of dosage in mouse protective units was misleading and inaccurate, because an important therapeutic action of the serum was thus disregarded. The standardization of the potency of antipneumococcic serum by its therapeutic effect on the experimental dermal pneumococcus infection in rabbits seems to be considerably more reliable as it measures the antibacterial as well as the non-antibacterial factors.

In a study[6] of the action of specific serum on the Type I pneumococcus dermal infection in rabbits, it was observed that the therapeutic effect did not depend entirely upon either the antibacterial factor, *i.e.*, mouse protective antibody, or the non-antibacterial factor alone. It was further shown that in a minimally effective therapeutic dose, the absolute concentration of either factor was inconstant and varied with the relative concentration of the other; when a relatively larger amount of antibacterial bodies is acting, less of the non-antibacterial factor seems to be necessary and conversely when more of the non-antibacterial factor is available, less of the antibacterial bodies is required. However, to render and maintain the blood stream antibacterial is one of the primary aims of serum therapy. To do this requires widely varying amounts of serum in different

patients depending upon the presence and degree of bacteremia, and the amount of soluble neutralizing substances that are liberated into the circulation. The intact organisms as well as the soluble neutralizing bodies are responsible for the rapid disappearance of the homologous agglutinins. When homologous agglutinins are not demonstrable in the patient's blood, the blood may or may not be antibacterial; when they are demonstrable, however, one can be more certain. It is for this reason, that the microscopic agglutinin test previously described, can be of aid in the control of dosage. When this test is used, sufficient serum must be administered within the shortest possible time to render the patient's blood positive for homologous agglutinins. The quantity of additional serum which is then to be administered should be controlled not only by the amount required to maintain the blood antibacterial, but also by the condition of the patient so that the dose of the non-antibacterial factor may also be adequate. In the experimental disease of rabbits it has been observed that when they are treated with a dose of serum which contains sufficient antibacterial bodies but an inadequate amount of the non-antibacterial therapeutic factor, most of the rabbits die; the additional injection of an adequate amount of this non-antibacterial factor, however, can save them from death.

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2. Sabin, A. B. The "Stained Slide" Microscopic Agglutination Test: Application to (1) Rapid Typing of Pneumococci; (2) Determination of Antibody. *Proc. Soc. Exp. Biol. & Chem.*, 26, 1929, pp. 492–494.
3. Cole, R. The Neutralization of Antipneumococcus Immune Bodies by Infected Exudates and Sera. *J. Exp. Med.*, 26, 1917, p. 453.
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VITAL STATISTICS

Provisional Summary of Mortality from Automobile Accidents in the United States Registration Area, 1932—Provisional figures, issued by the Census Bureau, show that 26,168 deaths from automobile accidents were recorded in 1932 in the death registration area of Continental United States (exclusive of the state of Utah), in comparison with 29,885 deaths in the same area in 1931. The death registration area, comprising 95.9 and 95.8 per cent of the total population of Continental United States in 1932 and 1931 respectively, registered automobile accident mortality rates of 21.9 in 1932 and 25.1 in 1931.

Considering the states by geographic divisions, the Pacific group had the highest death rate in 1932 as well as in 1931, the respective rates being 33.2 and 37.2. Next in order of groups in 1932 are the Mountain (26.6), the East North Central (24.3), and the Middle Atlantic (22.3)—each higher than the rate for the registration area. The groups having the lowest rates were the East South Central (15.0), the West South Central (16.1), and the West North Central (17.6).

Considering the states separately, those with the highest death rates from automobile accidents in 1932 were Nevada (63.4), District of Columbia

(38.7), California (36.9), Arizona (35.7), and Wyoming (34.5), while in 1931 the order was Nevada (68.5), Wyoming (43.0), California (40.5), Florida (34.4), and Arizona (33.6). The lowest mortality rates from this cause in 1932 were for North Dakota (8.3), Mississippi (11.4), Arkansas (13.9), South Dakota (14.1), and New Hampshire (15.0). States with the lowest rates in 1931 were in order of rate—Mississippi (14.0), North Dakota (16.1), South Dakota (16.6), and Oklahoma and Rhode Island (each 16.7).

In the group of 92 cities of 100,000 or more population, there were 8,573 deaths, or a rate of 22.8 per 100,000 population, from automobile accidents in 1932 as compared with 9,825 deaths, or a rate of 26.6 in 1931. The cities which had the highest mortality rates from automobile accidents in 1932 were Camden (65.4), Nashville (45.9), San Diego (41.6), Jacksonville and Tacoma (each 41.5).

The total number of deaths within a city should not be taken as the measure of the automobile hazard. The location of the city, the volume of automobile traffic, the hospital facilities, and other factors, should be considered in connection with the total number of deaths. A better measure of the automobile hazard within a city is the number of fatalities which result from accidents therein. Camden, N. J., serves as an excellent illustration of both of these conditions. Of the 78 deaths in this city due to automobile accidents, only 27 resulted from accidents within the city. The total death rate due to automobile fatalities was 65.4, while that due to accidents within the city of Camden was only 22.7. Similarly Trenton had a total mortality from automobile accidents of 33.0 and a death rate from automobile accidents within the city of 9.7 in 1932; other cities—Nashville with corresponding rates of 45.9 and 22.9, Reading with 31.3 and 11.6, Wilmington with 33.8 and 16.9, and Richmond with 36.1 and 17.3—also demonstrate the difference between these two death rates. —U. S. Department of Commerce. Bureau of the Census.

Vital Statistics for Germany in 1932—Reports of vital statistics for Germany in 1932 show reductions in marriages, live births, stillbirths, general mortality and infant mortality. In view of the great hardships which the country has suffered economically, it is remarkable that the decreases in births and marriages were no greater and that there were reductions in both the general and the infant mortality.

Marriages in Germany during 1932 numbered 509,591 as compared with 515,403 in 1931, the marriage rates being 7.9 and 8.0 respectively. While the marriage rate for 1932 is apparently slightly higher than that for 1913 (7.8) the latter year being considered a normal pre-war year, the figure shows an actual decrease if adjustment is made for the difference in the age distribution of the population in these two years. In 1932, the number of persons of marriageable age was considerably higher than in 1913. If the same proportion of men of marriageable age had married during 1932 as did in 1913, there would have been 610,000 marriages instead of the 509,591 which actually took place that year.

There were 978,161 births in 1932, as compared with 1,031,770 in 1931, which means a reduction of 53,609 in the number of births. Excepting 1917 and 1918, abnormal war years, 1932 was the first year (for which reliable statistics are available) during which the number of births was below one million. The birth rate declined from 16.0 in 1931 to 15.1 in 1932. Stillbirths decreased from 32,153 in 1931 to 29,475 in 1932, although the rate

remained practically the same, 3.1 in 1931 and 3.0 in 1932.

The number of deaths from all causes in 1932 was 697,895 and the death rate 10.8 per 1,000 population, as against 725,816 deaths and a death rate of 11.2 in 1931. Practically the entire reduction of about 28,000 in the number of deaths is accounted for by a lower mortality during the first quarter of 1932 over that of 1931, when an influenza epidemic brought the general death rate considerably above the quarterly average. Statistical data regarding the deaths from different causes in 1932 are not yet available for the whole of Germany. However, according to reports of the causes of death in the municipalities with populations of 15,000 and over, reductions of 9 per 100,000 from influenza and 13 per 100,000 from bronchitis and pneumonia were noted. There were reductions also in the death rates from the communicable diseases of childhood, tuberculosis and accidents, while suicide increased slightly in 1932 over 1931, and the diseases of middle and old age (cancer, diabetes, heart disease and apoplexy) showed somewhat greater increases. Infant mortality decreased from 83 per 1,000 live births in 1931 to 79 in 1932.—Die Bevölkerungsbewegung im Deutschen Reich im Jahre 1932. *Reichsgesundheitsblatt*, No. 27, 495–97 (July 5), 1933.

A Brief Statistical Analysis of Sanitary Conditions in Porto Rico During the Last Decade*—During the five years (1923–1927) preceding the San Felipe hurricane, Porto Rico recorded an average general death rate of 21.1 per 1,000 population, the rates in individual years showing fluctuations ranging between 19.4 and 23.4. During the following five years (1928–1932) in the course of which two hurricanes occurred, the average death rate was 22.0 per 1,000 population, only 0.9 higher than that for the previous five years; but the annual fluctuations were greater, varying between rates of 25.3 and 18.6. Basically the mortality conditions were similar in the 1923–1927 and the 1928–1932 periods, despite the occurrence of hurricanes in the later five years.

The San Felipe hurricane at the end of 1928 resulted in higher mortality rates for the years 1928 and 1929 followed by the low death rate of 18.6 per 1,000 population in 1930. In 1931, however, the general mortality rose to 20.4, and in 1932, the year of the San Ciprian hurricane, it increased to 22.3. The figures for the first three months of 1933 showed an average death rate of 23.0 (January 23.7; February 23.5; and March 21.9). This experience indicates that the 1933 death rate will be higher than that of the preceding year but lower than that for 1929, the year following the San Felipe hurricane.

Mortality from tuberculosis has climbed almost steadily since 1915 in which year the deaths from this cause numbered 173.3 per 100,000 population. With slight fluctuations, the rise has continued up to 1932 when a maximum rate of 293.7 was registered. The 1932 figure is the first computed under the revised classification of tuberculosis as adopted by the International Commission on Causes of Death in 1929. The wider scope of the 1929 classfication partly accounts for the large increase in 1932. Estimates of the number of tuberculous persons in the Island vary between a minimum of 20,000 and a maximum of 40,000. Hospital facilities will accommodate no more than 760 patients, which means that the large majority of tuberculous persons cannot be isolated nor given necessary care. The appropriations of the health department for the control of tuberculosis are also very inadequate.

* All the figures for 1932 and the first three months of 1933 are preliminary.

A similar situation exists in regard to the control of malaria which has shown no substantial decrease since 1911. In the case of malaria, however, atmospheric conditions bring about rhythmic fluctuations in mortality in cycles of 2, 3, or 4 years. Since 1926, when the rate was 140.2, there have been annual fluctuations culminating with the rate of 203.7 in 1931. Diarrhea and enteritis has shown variable mortality since 1911 with the highest rates being recorded in 1917 (389.4), and in 1928 (314.3). During the San Ciprian hurricane (1932) the rate was 246.9 as compared with 221.6 in 1931.

Compensating factors in the general health situation of Porto Rico are those connected with typhoid fever and diphtheria, two diseases, the control of which comes well within the means of the Island's health authorities. The mortality rate from typhoid fever in 1928 was 30.8; in 1929, 14.5; in 1930, 8.5; in 1931, 6.6; and in 1932, 5.1. Similarly the diphtheria mortality was 6.2 in 1928; 6.0 in 1929; 3.4 in 1930; 3.9 in 1931; and 2.9 in 1932. In both of these diseases the reduction in mortality has been not only constant but very marked, amounting to 83.4 per cent for typhoid fever during the five year period and 53.2 per cent for diphtheria during the same period. The infant mortality has decreased rather consistently since 1911 when the rate was 196 per 1,000 live births; in 1930, the minimum of 126 was reached. This was followed by 130 in 1931 and 132 in 1932.—*Sanitary and Demographic Bulletin of Puerto Rico.* English Supplement. Government of Puerto Rico Department of Health. Year II (May 15), 1933.

Deaths from External Violence in Canada, 1932—According to a report issued by the Dominion Bureau of Statistics the number of deaths in Canada from external violence during the year 1932 (preliminary figures) was 6,611 as compared with 7,172 in 1931 and 7,478 in 1930. The rate per 100,000 population was 63 in 1932 as against 69 in 1931 and 73 in 1930. The death rate from external violence for 1930 was the highest recorded in Canada during the period 1926–1932. The 1932 rate shows a fall of 10 per 100,000 from this peak and 6 per 100,000 from the rate for 1931.

Suicides numbered 1,020 in 1932, as compared with 1,004 in 1931 and 1,010 in 1930. All three of these years showed a marked increase over 1929 when suicides numbered 835. The death rate from suicide was 9.7 in 1932 and 1931, 9.9 in 1930 and 8.3 in 1929.

There were 157 homicides in 1932 giving a rate of 1.5 per 100,000. These figures compared with 172 deaths and a rate of 1.7 in 1931 and 214 deaths and a rate of 2.1 in 1930. The 1930 homicide rate was the highest in the period 1926–1932. In 1926 the rate was 1.3.

The number of deaths resulting from accidents in 1932 was 5,434 and the rate 52 per 100,000, as compared with 5,996 deaths in 1931 giving a rate of 58 and 6,254 deaths in 1930 giving a rate of 61. The 1932 rate was the lowest during the period 1926–1932.

Drownings in 1932, exclusive of those occurring in land or air transportation, numbered 980 or 18 per cent of the total of fatal accidents. Land transportation accounted for 1,586 deaths or 29 per cent of the total. Of these, deaths in automobile accidents numbered 1,111, or 20 per cent of all accidental deaths. Excluding those cases where an automobile was involved, there were 242 deaths in railroad accidents and 44 in street-car accidents. Eleven persons were killed during the year in aeroplane and balloon accidents.—Mimeograph release sheet. Canada Dominion Bureau of Statistics, June 28, 1933.

PUBLIC HEALTH ENGINEERING

Jail Sentence for Maintaining Cross Connections—For several years the Water Department of the City of Los Angeles has waged an energetic campaign against the practice of making cross connections between foreign sources of water supply and the city distributing system. This practice is forbidden by city ordinance No. 66498. It was discovered recently that certain fish companies in the harbor district maintained such cross connections between the city system and their own system, which provided water pumped from the bay. On December 7, 1932, complaints were shown by officials of the water department against four fish companies which maintained these cross connections. In the hearing which followed, the water department traced its vigilance in protecting its own supply and showed how its efforts were nullified through the maintenance of these cross connections. The court imposed jail sentences of fifteen days upon each of the defendants without the alternative of a fine. Subsequently, the sentences were suspended with warnings that future violations would result in more severe sentences not subject to suspension.—Anon., *Weekly Bull.*, California Department of Public Health, XI, 49:195 (Jan. 7), 1933. (From *Pub. H. Eng. Abstr.*, XIII, W, 28, 3-4-33.)

Why Not Make Garbage Collection and Disposal Self-Sustaining?—This brief article discusses the feasibility of financing refuse collection and disposal by a service charge or a special tax against the householder, rather than from the general tax levy. Many communities at present make a uniform charge per dwelling for the collection and disposal of refuse. One possible method is to make a charge according to weight of refuse collected but this is complicated by the necessity of maintaining records and of weighing the refuse. Another method is to have a schedule of rates based upon the size and type of buildings, and still another possible method is to have a schedule of rates based upon the assessed valuation of property. Paying for the collection and disposal of refuse in this way would permit municipalities to receive loans from the Reconstruction Finance Corporation for refuse disposal plants, such as incinerators, on a self-liquidating basis.—Harrison P. Eddy, *Am. City*, XLVII, 4:52–53 (Oct.), 1932. (From *Pub. H. Eng. Abstr.*, XIII, GR, 4, 3-4-33.)

The First Completely Air Conditioned Theatre in Spokane—A feature of the system of air conditioning used in the Spokane theatre is the location of the equipment above ground, in a manner to make it visible to passers-by. This design eliminated expensive basement excavation (Spokane is built on solid rock) and serves as an excellent means of advertising the system. Another feature of economic consideration is the use of a compound air washer, the first using city water and the second refrigerated water. This type of washing system was installed in order to take advantage of the low maximum temperature of the city water in the summer months (52° F.), thus requiring a rather small refrigerating system. Other features of this system are provisions for exhausting the air in the projection room and the rest rooms, the exhausted air being delivered outdoors. The capacity of the exhaust fans is less than the air supplied for

ventilating purposes, thus keeping the theatre under a slight pressure and preventing the infiltration of dust. The air conditioning plant is designed to maintain in the theatre proper a dry bulb temperature of 80° F. with a relative humidity of 44 per cent when the outside dry bulb temperature does not exceed 95° F. and a wet bulb temperature of 75° F. These conditions are maintained at a capacity of 2,200 occupants.—R. H. Beck, *Heating & Vent.*, XXX, 1:31–33 (Jan.), 1933. (From *Pub. H. Eng. Abstr.*, XIII, AC, 3, 3-11-33.)

Ammonia Chlorine Treatment Used on East Providence, R. I., Water Supply—The water, from Ten Mile River, having a drainage area of 54 square miles, containing some swampy areas, has an inferior bacterial quality and a wide variation in color. Chloramine treatment was started in March, 1931. This permitted the carrying of a much higher residual chlorine, reduced aftergrowths in the clear well resulting in very soft instead of hard growths on the pipes in the clear well. Also the filters remain much sweeter and cleaner, although showing no increase in length of run nor reduction in wash water.

The fact that the ammonia chlorine treatment is slower to act was not important even though the nearest consumer is within 400 ft. of the filter plant; samples of water taken twenty minutes after the addition of chlorine, the time estimated as required to reach the nearest consumer, showed no difference whether ammonia was used or not, when tested bacteriologically. Other tests showed that the orthotolidine test could be relied upon, but must be interpreted differently and more cautiously. The ortho-toluidine should be added and the reading made within about 20 minutes of the collection of the sample, but in an extreme case in December the sample did not develop its full color until 45 minutes.—James V. Turner, *W. W. Eng.*, LXXXVI, 5:208–209 (Mar. 8), 1933. (From *Pub. H. Eng. Abstr.*, XIII, W, 49, 4-29-33.)

Institutional Sewage and Sewage Flow Characteristics—The results of studies on characteristics of institutional sewage flows and raw sewage composition are given with reference to the effect of these factors on plant design and operation. Average daily flows varied from 99 to 266 g.p.c. and showed some correlation with type of institution. The lowest ratio of maximum to average rate of flow was 1.5. Contrary to the general impression, institutional sewages were in all cases from two to three times stronger than strictly domestic sewages. The average 5-day B.O.D. on the basis of 100 gal. per capita flow was 472 p.p.m. Per capita 20-day oxygen demand varied from 208 to 286 grams per day. Both settleable and non-settleable solids were generally higher than domestic sewage. In some cases the grease content of raw sewage was very high. Sludges were quite similar to domestic sludge.

High flow rates and stronger sewages vary with different institutions and their topographical situations. Before designing an institution sewage treatment plant a careful study of rate of flow should be made and the sewage should be analyzed.—G. M. Ridenour and I. O. Lacy, *Sewage Works J.*, IV, 6:1046–53 (Nov.), 1932. (From *Pub. H. Eng. Abstr.*, XIII, S, 31, 5-6-33.)

The Electrical Precipitation of Sewage—A description of the electrical process of sewage treatment first tried out on a plant scale in 1888–1889 by Webster at the South Metropolitan outfall at Crossness. This article is principally about the recent work done with this process by the Niersverband,

one of the youngest German river authorities. The process depends upon the passage of the sewage between metal electrodes, the metal going into solution in the form of ions at anode, and then being rapidly converted into the soluble hydroxide resulting finally in the flocculation of the polluting matter in the sewage, which is then settled out. The permanganate absorption of the sewage has been reduced 45 to 50 per cent and the biochemical oxygen demand 60 per cent by this treatment. Compressed air is used to obtain mixture of the tank contents. It is stated that the energy obtainable from the gas produced in digestion of the sludge is sufficient to meet the electrical and air requirements. Iron is said to be the best electrode material, and that it requires about 50 gm. of iron per c.m. of sewage treated. An experimental plant working on the electrical system was constructed at the Rheydt sewage works and the results obtained there confirmed laboratory results.—*Surveyor*, LXXXIII, 2139:61 (Jan 20), 1933. (From *Pub. H. Eng. Abstr.*, XIII, S, 31, 5-6-33.)

An Unusual Sewage Treatment Plant—Sewage from London, Ontario, is disposed of in four separate treatment plants. This article describes the new West End plant designed to treat the maximum flow of 6,000,000 gallons per day. This plant consists of the following units: a large grease trap; grit chamber, fitted with one-inch diameter perforated pipes for admission of either air, or water at intervals to wash grit free of entrained organic matter; a Hankin paddlewheel type, screen with ½ inch clear openings revolved by the sewage flow; a Hankin fine screen; 24 aeration tanks, which provide ⅛ hour's detention. Two compressors of 500 cubic feet and one compressor of 1,500 cubic feet per minute of free air, compressed to 10 lbs. pressure, are used to force air through three types of diffusers, namely—filtros plates, activated sludge, ltd. plates, and ¼ inch diameter perforated pipes. Air piping is arranged to permit flexibility of operation. There are 2 50-ft. square tanks fitted with Hankin-Fidder scrapers of the twin spiral type. The detention period is one hour and 12 minutes.

The unusual feature of this plant is the discharge of excess activated sludge into the raw sewage whereby the activated sludge adheres to the sewage solids and is removed by the fine screens. The solids so removed are incinerated in a small incinerator. Auxiliary fuel is only required to start the incinerator, which has a capacity of 10 tons of wet screenings per day. Before the screenings are incinerated they are pressed in a home made equipment. The moisture content of the pressed screenings and activated sludge is 87 per cent. The total cost of the plant is estimated to be $190,000.—W. M. Veitch, *Am. City*, XLVIII, 2:54–56 (Feb.), 1933. (From *Pub. H. Eng. Abstr.*, XIII, S, 24, 4-1-33.)

The Effect of Pasteurization Upon Brucella Melitensis Var. Suis—Pasteurizing tests using a standard pasteurizing outfit were undertaken to determine whether the porcine strain of the Brucella organism was destroyed during the process. Checks on the efficiency of pasteurization were made with milk inoculated with the bovine strain of the organism.

It was found that a temperature of 62 to 63° C. (143.6 to 145.4° F.) for 3 minutes was sufficient to destroy both types of the organism. This shows that the usual pasteurizing procedure when correctly operated provides an ample factor of safety. However, with the lid of the pasteurizer open a much longer exposure was necessary, and the results were irregular and uncertain. The viable organisms were recovered from the foam of such milk even after

30 min. When an ordinary faucet outlet was used on the pasteurizer live organisms were isolated from the outlet after 30 min. pasteurization, while when the outlet was closed by a stopper on the inside no living organisms remained after 3 min. exposure.—C. Murray, S. H. McNutt, and P. Purwin, *J. Dairy Sci.*, XV, 1:6–13 (Jan.), 1932. *Experiment Station Record*, U. S. Department of Agriculture, LXVII, 6:734 (Dec.), 1932.

INDUSTRIAL HYGIENE

Chemical Haematuria from Handling 5-Chloro-Ortho-Toluidine—Nine cases of haematuria in connection with the purification of 5-Chloro-Ortho-Toluidine and also its hydrochloride derivatives are discussed. These cases occurred in an epidemic extending over a period of four months. The toxic substance and its mode of entry is not definitely known. In the haematuria cases the bladder was chiefly affected, although the kidney was involved to a slight extent. Cyanosis was present, with strangury and frequent micturition, with exfoliation of the bladder epithelium.

The processes followed in the purification of these aniline products are also described.—Arch. N. Currie, *J. Indust. Hyg.*, 15:205–213 (July), 1933.

L. G.

An Outbreak of Dermatitis in Cotton Mills Due to Varnish—Cases of dermatitis occurring in a textile plant were investigated. The dermatitis was confined to parts of the workers' arms that rubbed against heddle frames which were coated with a particular varnish. Nineteen out of 32 workers exposed to this varnish contracted dermatitis. By means of patch tests the cause was finally traced to two ingredients of the varnish, cumaron resin and ceresin. Varying individual susceptibilities were demonstrated.

The addition of normal saline solution to the materials used in the patch tests to simulate action of perspiration added to the irritating action of these substances on susceptibles. — Louis Schwartz and Charles L. Pool, *J. Indust. Hyg.*, 15:214–225 (July), 1933.

L. G.

A Case of Carbon Monoxide Poisoning From an Oil Stove—The case history and discussion of a suspected case of carbon monoxide poisoning from a smoking oil stove are presented. The peculiar features of the case were: an unusually long period (3 days) of coma with subsequent recovery; several canary birds and a dog in the room and adjoining room were unaffected; and failure to demonstrate presence of carbon monoxide haemoglobin on spectroscopic examination (later discovered that a faulty technic had been employed).

The importance of a properly conducted blood examination after a case of carbon monoxide poisoning as a means of diagnosis and for medico-legal consideration is stressed. Several tests for the detection of carbon monoxide haemoglobin in blood are suggested.—Lewellys F. Barker, *J. Indust. Hyg.*, 15:238–241 (July), 1933. L. G.

The Relation of Carcinogenicity of Mineral Oils to Certain Physical and Chemical Characteristics of These Oils—The various properties of oil in relation to their carcinogenicity were studied. The refractivity of an

oil appeared to be a good indication of its field of origin as well as a probable indication of its carcinogenicity. The iodine value of an oil also seems to afford an index of its toxicity provided it has not been treated. Oil from 11 different fields were studied and out of these the Pennsylvania oil alone failed to follow the general index of carcinogenicity as determined by the above methods.

The permanganate oxidation values give varying results and are therefore not considered to be of any value in estimating the toxicity of oils.—R. Lyth, *J. Indust. Hyg.*, 15:226–237. L. G.

Sand and **Metallic Abrasive Blasting as an Industrial Health Hazard**—This is a study of the dust hazard in air pressure abrasive blasting operations. A preliminary survey and analysis of the equipment found in 44 plants in 8 states was made, followed by a detailed study of 28 shops located in 4 States. The survey showed that sand was used as an abrasive in 64 per cent of the cases, metal (steel grit and shot) in 34 per cent, and a mixture of sand and metal in 2 per cent of the cases. A description of the four types of generally used air pressure abrasive blasting equipment is presented.

The detailed study consisted of a general plant survey, dust sampling with the Greenburg-Smith impinger, determination of particle size and mineralogical composition and ventilation observations. The efficiency of the positive-air pressure helmet with various quantities of air flow was also determined.

The results showed the following: (1) The particle-size of practically all the dust was less than 5 microns, modal size between 1–1.5 microns, and only 1 per cent was less than 0.5 microns in size. (2) When sand alone was used the quartz content varied from 42–98 per cent; quartz content of air with sand and metal mixtures as abrasive averaged 44 per cent; and quartz content 3 per cent with metal abrasives. (3) The dust concentration (in millions of particles per cubic foot of air) was as follows: Sand blasting rooms (exposure under helmet with non-positive air pressure) 241; sand blasting room (exposure under helmets with positive pressure) 4.7; barrels, 29; tables, 25; cabinets, 3; automatics, 24. (4) Dust hazard is present even in well designed and adequately ventilated rooms with properly designed and maintained equipment when abrasive blasting is in progress. This indicates the necessity for special protection of the worker. (5) The provision of a positive supply of 6 cubic feet of dust-free air per minute to the helmet will protect the worker under actual operating conditions in an abrasive blasting room.—J. J. Bloomfield and Leonard Greenburg, *J. Indust. Hyg.*, 15:184–204 (July), 1933. L. G.

Pulmonary Asbestosis: Its Clinical, Radiological and Pathological Features, and Associated Risk of Tuberculosis Infection—The clinical, radiological, and pathological feature of asbestosis are excellently presented. Symptoms of asbestosis generally appear after several years of exposure to this dust—usually after 5–15 years. The average length of employment in fatal cases is about one-half that in silicosis. The symptoms of asbestosis are dyspnoea which is usually out of all proportion to the clinical findings, cough, expectoration, anorexia, cyanosis, emaciation, finger clubbing, and asbestos corns. These symptoms are aggravated during the winter season. Limited chest expansion, impaired percussion note, fine, dry crackling râles and pleural friction sounds are some of the common clinical findings.

The radiological studies are characterized by a fine, diffuse pulmonary fibrosis commencing at the base of the

lungs. The author is of the opinion that a radioscopic examination of the chest followed by a satisfactory radiograph affords the most reliable single evidence in establishing a diagnosis of the state and extent of asbestosis cases.

The characteristic golden-yellow asbestosis bodies found in the sputum and fibrosed lungs of the asbestos workers are described. It is interesting to note the persistency of these asbestosis bodies in the sputum; a patient exposed to asbestos dust for one year showed the presence of these bodies in the sputum 14 years later.

Pulmonary asbestosis, once established, is a progressive disease with a bad prognosis. Until recently tuberculosis complication in asbestosis was thought to be rare but the experience of the author casts some suspicion on this belief. The recognition of the existence of a tuberculosis risk in asbestosis is important when considering preventive measures for this occupational disease. —Philip Ellman, *J. Indust. Hyg.*, 15: 165–183 (July), 1933. L. G.

Filtered Air Relieves Hay Fever—This is a study on the removal of symptom-producing substances in hay-fever and pollen asthmatics by the filtration of air. The process of filtration differs somewhat from dust removal in that it is necessary to remove all possible allergic material in order to relieve highly sensitized individuals.

The efficiency of the filters as determined by (1) exposing vaselined slides to the air before and after filtration and (2) counting pollen grains on vaselined slides exposed to outdoor and indoor air, was from 96–98 per cent. The authors believe that a high efficiency of removal may be obtained by using large filter areas with low air resistance and low velocity of air flow.

Clinical observations were made on hay fever and pollen asthma patients who were admitted to the filtered air wards in the evening for a period of 12–16 hours and then sent out during the day. The study showed that symptoms of hay fever would disappear in 80 per cent of the cases after an exposure of 3 hours or less to filtered air. The disappearance of symptoms was not indicative of cure since there were recurrences of symptoms on exposure to pollen-laden air. The filtered-air treatment, however, is of value since it increases the personal efficiency of the patients in giving them an increased amount of restful sleep. Pollen asthma patients respond more slowly to treatment and no appreciable relief could be obtained unless the patients were exposed to the filtered air continuously.—William W. Welker, B. Z. Rappaport, and Tell Nelson, *Heating, Piping & Air Conditioning*, 5:348–350 (July), 1933. L. G.

Industrial Diseases of the Skin—The chief industrial diseases of the skin are: Anthrax, the most dramatic and perhaps the least common; cancer; and trade dermatitis. Not less than 15,000 cases of dermatitis are certified by factory surgeons every year. Anthrax, chromium compounds, dermatitis in the food industry (bakers, confectioners, and jam makers) are discussed briefly.

Dr. N. Howard Mummery, in discussion, stated that the dermatoses seen in industry, with a few exceptions, were not peculiar to the occupations involved, nor were they more common among industrial employees than among the rest of the community. True industrial dermatitis was uncommon and many of the substances handled were the same as used at home. The warm months, new workers, the state of the skin, were the important factors. "A girl might work for years at a job without any skin trouble, and then become highly sensitive to the irritant; after some months she might again become immune to it."—H.

Haldin-Davis (excerpts from address), *Lancet*, 5729:1288–1289 (June 17), 1933. E. R. H.

Effects of Dust Upon the Respiratory System—This is the proceedings of a special conference held in Chicago, Nov. 16–17, 1932, under the auspices of the Industrial Commission of Wisconsin, whose Chairman, Fred M. Wilcox, opened the conference. The first address was by Dr. Leroy U. Gardner, Director of Saranac Laboratory for the Study of Tuberculosis, who discussed, for the lungs, the anatomy, the treatment of inhaled foreign bodies, pathology, tuberculosis of various types, and pneumonia. This address with intercurrent discussions by those present covers approximately the first 50 pages of the proceedings.

The second address was by Dr. W. Irving Clark, Medical Director of the Norton Company, Worcester, Mass., and concerns the composition of abrasive wheels, with the showing of chest X-ray films after various years of exposure (pp. 50–70, including discussions).

Dr. Gardner then resumed his address, in which he summarized and amplified his previous remarks, accompanied with a series of 39 slides.

The third address was by Donald E. Cummings, Assistant Director of the Saranac Laboratory, who took up the chemical and physical properties of certain dusts, followed by a discussion of the silicosis hazard in the lead and zinc mines of Picher, Okla. Discussions of Mr. Cummings' and Dr. Gardner's addresses continue to page 124. Next, Dr. H. S. Willis, Pathologist of the Maybury Sanatorium, Detroit, discussed the pathogenesis of silicosis and its relation to tuberculosis, with results of animal exposures, exposure to vegetable and mold dusts, and roentgenological evidences followed by a brief general discussion).

J. J. Bloomfield, Sanitary Engineer, U. S. Public Health Service, followed with an address on the nature of dusts, and especially of silicious dusts, the size of dust particles, dust concentration, and dust suppression—with bibliography (pp. 136–166).

The concluding address was by Dr. Albert E. Russell, Surgeon, U. S. Public Health Service and U. S. Bureau of Mines, who reported upon the study of the dusty trades, beginning with the cement industry in 1924, and accompanied his discussion with X-ray slides from different industries showing various reactions to dust (address with discussion, pp. 167–207).

The Report concludes with brief biographic sketches of the six principal speakers and a list of the 67 persons in attendance.—Wisconsin Indust. Comm., Madison, 215 pp. (Feb.), 1933.

E. R. H.

Arsenic Poisoning in a Manganese Factory—Dr. Salmon and Dr. Planque (*Ann. d'hyg. pub. indust. et sociale*, April, 1933) have lately described an outbreak of arsenic poisoning in a factory which, in December, 1929, began to crush and dry salts of manganese. In October, 1932, some of the employees were found to be suffering from such symptoms as pain in various parts of the body, difficulty in walking (particularly downstairs), stuttered speech, and mask face. The extensors of the legs were slightly atrophied and a steppage gait present. In none of four cases were there cutaneous manifestations, a positive Wassermann, cyanosis of the extremities, or hyperkeratosis of the palms of the hands or soles of the feet. In diagnosis, lethargic encephalitis and disseminated sclerosis had to be considered.

Inspection of the factory showed the workers looked like "blackamoors," so thick was the manganese dust on them. They were all indoor workers. How-

ever, one of the most exposed to the dust had shown no signs of poisoning. Also those who worked outdoors were free of symptoms. "An analysis of the powder handled in the factory showed it to contain over 81 per cent of the oxides of manganese, and over 9 per cent of silica. It also contained 0.013 per cent of arsenic." (Surely these cases would be called *manganese poisoning* in this country, where several similar reports had been made since the first one by Casamajor in 1913.)—(*Abstractor's comment.*) *Lancet* (Notes, Etc.), 5729:1325 (June 17), 1933.

E. R. H.

FOOD AND NUTRITION

The Character of the Dermatitis-Producing Factor in Dietary Egg White as Shown by Certain Chemical Treatments—This represents an extension of work previously reported (Abstract, *A.J.P.H.*, Vol. 21, May and Sept., 1931), in an effort to determine the nature of the toxicity of Chinese dried egg whites. Rations employing respectively 66, 40, 30 and 20 per cent, on a dry basis, of egg white, were given to rats. The pellagra-like symptoms in these young rats were first produced by a basal egg white ration with 66 per cent of egg white. Substitutions or additions to the diet were then made to determine the effect of various methods of treatment of the egg white. Results were measured by the degree of severity of the pellagra-like syndrome. Definite toxic symptoms followed the ingestion of Chinese whites, raw and dried, fresh whites, raw and dried, Chinese whites precipitated by alcohol and dried. In the latter case, neither treatment with alcohol for 35 days nor dialysis of the alcohol precipitate for 50 hours before drying lessened the toxic symptoms. No beneficial effect was secured from Chinese dried whites either treated with nitrous oxide or when treated with formaldehyde. When 1.6 c.c. normal hydrochloric acid per gram was added to the Chinese whites incubated at 37° for three days and dried, the animals showed a prompt response with a disappearance of the pellagra-like condition. The same results were secured with this percentage after neutralizing and drying. The addition of 1 per cent normal hydrochloric acid per gram and incubation did not relieve the toxic condition of the egg white nor did the addition of 1.6 c.c. normal acetic acid with similar incubation. Satisfactory curative results were secured with fresh egg whites heated to 80° for either 5 or 20 minutes. The toxic effects were apparently not due to denaturation as evidenced by the toxicity of egg white after it is denatured with alcohol. There is an indication that the detoxification involves hydrolysis. The same satisfactory result was secured with 1.6 c.c. normal hydrochloric acid per gram, either with or without peptic digestion. —Helen T. Parsons and Eunice Kelly. *J. Biol. Chem.* 100:645 (May), 1933.

Effect of Sunshine Through Window Glass and Fresh Air on Resistance to Infection—The effective narrow band of ultra-violet solar rays which prevent or cure rickets does not penetrate common window glass. Little definite information exists as to the effect of either the visible or infra-red rays on the growth of the animal organism. Several investigators have shown the effect of clouds, dust and smoke on the ultra-violet rays, particularly during the winter months. The observation is made that the same influence affects the intensities of the

visible and infra-red rays, and the therapeutic value of sunshine with fresh air in the treatment of tuberculosis is cited.

In these experiments, young rats on a normal diet without any concentration of vitamin D, such as cod liver oil, were kept away from sunshine. Once a week, litters of these rats, from 25 to 27 days old, were divided into 5 groups and 3 of the groups placed on a modified rachitogenic diet. For 4 weeks one group was given direct sun bath under window glass from 11:00 A.M. to 1:00 P.M. The total sunshine received in the experiment was from 25 to 35 hours. Another group of rats was exposed to fresh air only, but all other conditions were the same. A third group was kept inside. At the end of 4 weeks, no great differences in weight were shown in the three lots. At this time two representative rats from each group were used for the determination of inorganic phosphorus in the blood and the percentage of bone ash in the long bones. Very little difference is shown between the three groups. Rats were then infected with a culture of "rat typhoid" a strain of *Salmonella enteritidis*, isolated from the infected middle ear of a white rat. Four weeks after infection, experiments were terminated with the result that the rats given fresh air and sunshine through common window glass survived in greater numbers than the group kept inside. The rats kept in fresh air survived better than those kept inside except in one instance. Conclusion, therefore, is drawn that both fresh air and sunshine through glass increase resistance. In the case of rats which received a modified rachitogenic diet fortified with additional vitamin D, the rats exposed to direct sunshine through glass withstood infection better than the inside controls. Fifty-seven per cent of the rachitic rats under common window glass survived, against 32 per cent kept inside. With the vitamin D, 75 per cent of those exposed under glass survived, against 61 per cent kept inside. The vitamin D furthermore increased the ability of the rats to withstand infection.

The authors point to the fact that on a rachitogenic diet the increased resistance was not responsible for the improvement of the rickets, since the sunshine which penetrates common window glass is without antirachitic effect. They conclude with the following:

> The vital radiations from the sun should not be limited to the narrow band in the short ultra-violet region, which is antirachitic. The foregoing results show definitely that rays longer than those that are necessary to prevent or cure rickets have a marked effect on the animal organism, as evidenced by a decided increase in resistance to infection.—

John R. Ross, Elizabeth Chant Robertson, and Frederick F. Tisdall, *Am. J. Dis. Child.* 45:81 (Jan.), 1933.

Food Poisoning Due to Staphylococci—An outbreak of gastroenteritis occurred among women students of a southern educational institution involving 150 marked cases, 75 of which were severe. A number of other victims suffered less severely. Conclusive epidemiologic evidence incriminated chocolate eclairs as the vehicle carrying the causative agent. Of those who ate eclairs, 60 or 70 per cent were affected. The onset of symptoms was within two or three hours following ingestion. The custard filler for the eclairs was prepared at the bakery in the morning and the eclairs were delivered at 11:00 A.M. There were several batches of eclairs which may help to explain why more of those who ate eclairs were not made ill. The symptoms were marked by nausea, salivation, abdominal pain, vomiting, extreme prostration, profuse diarrheal attacks and chills. Bacteriological examinations of the custard from the

eclairs and of the pastry disclosed the presence of numerous yellow staphylococci and no organisms resembling the Salmonella group. Ten cubic centimeter quantities of bacteria-free filtrates prepared from cultures of the cocci were fed to each of eight human volunteers in 200 c.c. of pasteurized milk. As controls, four students were given similar amounts of sterile broth of the same batch used for growing the organisms. Of those receiving the filtrate all were ill except one; she was slightly nauseated and felt weak. None of the controls was affected. All symptoms, which appeared in from 1¼ hours to 3 hours, were similar to those exhibited by the women students who were sick following the consumption of eclairs. Examination of all ingredients used in preparing the eclairs and careful investigation of conditions at the bakery failed to disclose the source of the staphylococci. Experiment showed that the cocci isolated from the eclairs would be destroyed at the temperature and during the time of cooking the custard filling. It is stated that pastries, custard fillers and the like should be well protected against contamination in preparation and storage. Custard fillers should be refrigerated. After baking, cakes and pastries should be covered or placed in specially constructed cases and not left in the open. These precautions could well apply to the storage and handling, following delivery, especially in institutions where a large kitchen force is employed.—Ralph McBurney, *J.A.M.A.* 100:1999 (June 24), 1933.

Studies on the Physiological Action of Glycerol on the Animal Organism—The authors have summarized their work as follows: In studies of replacement of carbohydrate by glycerol in the diet of rats (40 weeks) to a point where glycerol constituted 41 per cent by weight of the total food intake, and in the diet of dogs (50 weeks) until it amounted to 35 per cent of the intake, normal growth occurred. Reproduction in rats was unaffected. Addition of glycerol to a rat diet qualitatively adequate but quantitatively just sufficient for maintenance of body weight caused a resumption of normal growth. Addition of 110 grams of glycerol per day (50 days) to an adequate diet in man produced a slight tendency toward increased body weight.

Ingestion by growing dogs of 9 grams of glycerol per kilogram per day for nearly a year did not change the red blood cell count. Ingestion by man of 110 grams of glycerol per day for 50 days did not affect the red or white cell counts or the hemoglobin content of the blood. In neither man nor dogs was albuminuria or hemogloburia produced from glycerol taken orally, although both of these phenomena were produced in dogs upon parenteral administration. Glycerol per os in relatively large quantities exerts a diuretic action in dogs and rats, but in the quantities fed to man it lacked this effect. The body temperature of man and dogs was unaffected by glycerol ingestion. No adverse subjective effects in man and no changes in the general appearance and behavior of rats and dogs throughout the observation periods, resulted from glycerol ingestion in the quantities used. In man the basal metabolism and uric acid excretion were not significantly affected. Activity of the large intestine of man as regards daily number and consistency of stools, was unaffected by the quantities of glycerol fed. No gross or microscopic pathology was detected in rats and dogs reared (for nearly a year) on diets of high glycerol content. —Victor Johnson, A. J. Carlson, and Adelaide Johnson, *Am. J. Physiol.* 103: 517 (Mar. 1), 1933.

CHILD HYGIENE

THE TUBERCULIN SKIN TEST FROM THE SCHOOL PHYSICIAN'S STANDPOINT

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DURING 1931, 769 Clevelanders succumbed to pulmonary tuberculosis.

86 of these cases were reported three months before death,
140 only one month before death,
131 less than one month, and,
79 at or after death.

A total of 436 cases were reported only three months or less before death. The amount of damage resulting from the dissemination of the tubercle bacilli cannot be calculated.

Too long has the medical fraternity placed its chief reliance on the use of the stethoscope. Too long have we been concerned only with the familiar type of the disease. The hidden and dormant type with only an involvement of the lymph nodes with possible minor changes in the adjacent lung tissue, has until of late been unrecognized. For a number of years we have known of this childhood type of tuberculosis and have sought to recognize it by means of a chest examination of each elementary school child. The stethoscope, aside from cardiac ailments, has revealed little of value. The time and the effort of a trained staff of physicians in the discovery of pulmonary lesions did not produce results commensurate with the cost of the service.

The pupils of our open air classes were mainly selected from a group of underweight children, since it had always been assumed that the poor underweight was in the pre-tuberculous stage and must be provided with a hood and coat and placed in a room that had escaped the notice of the mechanical ventilation expert. This arrangement provided rest periods, fresh air and food for these underweights who were often tuberculosis contacts. Upon the whole it was questionable whether our open air classes (22 in number) produced results which justified the extra outlay of money necessitated. In order to determine whether the 50 per cent extra expense per pupil was really justified in terms of health, a competent member of our Health Service Staff, Dr. Joyce I. Hartman, made a survey of our open air classes during the school year 1930–1931 and submitted the following report:

The open air school rooms were instituted in Cleveland 20 years ago primarily for tuberculous children whose condition was not regarded as serious enough to warrant hospitalization or "preventorium" care. The beneficial effects of special rooms, extra rest, and extra food have always been recognized in the care of such individuals. Since the cost of maintaining these special rooms is high (at least 50 per cent additional per pupil) it has been important to select the proper children. The selection of these children has been a problem. Until recently they have been selected upon the following criteria: (1) Malnutrition, (2) symptoms such as cough, (3) history of contact, (4) opinions of school physicians, nurses, and teachers. It has been recognized that such methods were grossly inaccurate. During the school year of 1930–1931 it was decided to make a survey

of the pupils in the open air rooms to find out what percentage, selected upon the above basis, have or have had a tuberculous infection as is shown by the most reliable method available, the intracutaneous tuberculin test. These tests were made with dilutions of old tuberculin (human) and phenolized saline controls. These tests were done upon the forearm, and in 95 per cent, 1 in 1,000 solution of tuberculin was used. Where there was any evidence of possible increased sensitivity such as scars on the cornea due to old phlyctenular ulcers, history or evidence of asthma and other allergic diseases, a dose of 1 in 10,000 solution was used. The tests were read in 48 hours. Only one test was made on each individual and it is admitted that probably in a few cases the reaction appeared negative, which with the repetition of a greater dosage might have been positive. No severe generalized reactions occurred.

One hundred and seventy-eight boys and 310 girls, a total of 488 pupils in 22 open air rooms in seven different schools were tested. An average of only 35 per cent was found positive. There was a 2 per cent sex difference, the boys being higher. The age range of these children was from 7 to 12 years.

In one school where 100 pupils were tested, only 16 per cent were found positive. This school is located in an Italian section. The highest percentage was found in a Negro school where 71 pupils were tested, 52 per cent being found positive.

Eighty-five per cent of the open air pupils were underweight (8 per cent or more according to the height-weight charts). The percentage of malnutrition was the same in the schools where the percentage of positive tuberculin tests was low—16 to 20 per cent; and where it was high, 52 per cent. Only 35 per cent of the underweight children in the open air rooms had positive tuberculin tests.

These facts verify what we thought was true, that pupils had been placed in open air rooms chiefly on the basis of malnutrition, and corroborates our opinion, and that of others, that tuberculosis is not a common cause of malnutrition in the pre-teen age.

Sixteen per cent of the children tested came from families where there was some record of tuberculosis in another member of the family. Seventy-five per cent of these had positive tuberculin tests.

At present, tests are being made in the regular rooms to ascertain the proper location of open air rooms and to replace the 65 per cent of negative reactors now in open air rooms. Plans are being made to obtain roentgenograms of the chests of all positive reactors as this offers the best if not the only means of ascertaining the activity and extent of the disease.

CONCLUSION

(1) The work has demonstrated the practicability of the intracutaneous tuberculin test in public school health work.

(2) The intracutaneous tuberculin tests as done in the open air schools of Cleveland show, (a) that tuberculosis is not concerned in large percentage (65 per cent) of malnourished children of the pre-teen age. (b) That a large percentage (75 per cent) of children from tuberculous families reported by the City Health Department have or have had a tuberculous infection.

(3) It is our opinion that the intracutaneous tuberculin tests supplemented with roentgenographic studies of the positive reactors is probably the only satisfactory method for selecting pupils for open air class rooms.

I am not taking the attitude that open air rooms should be available only to the delicate child showing a positive cutaneous test. There are other pupils among which are certain cardiacs in need of rest periods; asthmatics in need of oxygen; and grave cases of malnutrition in need of food, rest, and a knowledge of simple health rules. In general, however, open air rooms should be used for delicate pupils with the childhood type of tuberculosis.

The early detection of this infection rests with the needle and not with the stethoscope. Dispensaries are provided in a majority of school buildings, but they are not the quiet places that one could wish for in the careful auscultation of the lungs of school children. Such an examination is unnecessary in the negative reactors, or about 80 per cent of elementary school children, and 40 per cent of the pupils of high school age. Thus the school physician is relieved of a vast amount of chest auscultation carried out under difficult conditions and as far as the detection of a tuberculous infection is concerned, with meager results.

But some one enquires; is not this method of ferreting out open cases of

pulmonary tuberculosis among the parents through the detection of recent infection in their children exceedingly costly? After all, are not the results so meager that it is really better to conserve the tax-payer's dollar and, if need be, to spend the same for wholesome food which in turn will tend to prevent tuberculosis?

If it is good policy for the public to spend public funds liberally in the detection and the subsequent trial and incarceration of a criminal, why will not society profit to an equal degree by the detection and the subsequent examination and the safeguarding of the public from an open case of pulmonary tuberculosis. Both are a menace to the public. Both may require confinement. The one in a prison, the other in a sanatorium. Both bring tragedy to the home.

Preventive treatment would have saved either. The criminal could have been saved by the psychiatrist had he been discovered at an early date and a proper training instituted. The positive reactor to the tuberculin test could have been taught to know his own limitations. Health education in the school curriculum would have taught him health habits which would by their exercise, have prevented the extreme tragedy.

If then, it is good public policy to safeguard a child with criminal tendencies by educational procedures, it is likewise good public policy to safeguard a child with tuberculous tendency, to teach him to know his limitations and the simple laws of health the following of which will enable him to avert the supreme tragedy.

Upon the whole, if it is a good procedure to employ a Sherlock Holmes to ferret out a criminal who is a menace to society, it is equally justifiable to use Sherlock Holmes methods in our medical school work in order that the open case may be discovered and educated or isolated and society protected.

As a concrete example of this ferreting procedure, I offer the following case:

> William and Lucille F——— were found to be positive reactors by our physician assigned to the Kennard School. Both were examined by him and were sent to a health station maintained by the Board of Health where they were X-rayed. William's X-ray showed healing primary tubercles. Lucille, who was running a temperature afternoons showed the shadow of her right hilum to be denser than normal.
>
> The family follow-up record of the Department of Health nurse indicated that both parents were well nourished healthy people. However, there was a third child, Ruth, age 20 years, who was working as a maid in an East Cleveland home who was reported well by her parents. She was found to be a moderate tuberculosis case with positive sputum and sent to a sanatorium at once for treatment. Ruth was badly exposed to tuberculosis by a maid in this East Cleveland home who occupied the same bed until she was sent to the City Hospital, where she died soon after.

It may be noticed in this case, which illustrates many others, that there was perfect coöperation between the Department of Health Service in the schools and the City Health Department and that there was no duplication of effort.

Add to this combination, the school's Division of Health Education which seeks to instruct the pupil in simple health laws and is interested in his nutrition, and also add the Anti-tuberculosis League with its inspiration and oftentimes funds, we then will have a combination that is quite effective in the handling of the childhood type of tuberculosis problem.

PUBLIC HEALTH NURSING*

Nursing Education in the Future—More and better theory. Less and better practice. These are the two probable changes that the near future will bring in nursing education, according to the Committee on the Grading of Nursing Schools.

There are few forms of education for professional workers in which seven times as much practice as theory is needed. Yet 885 hours of theory is the amount recommended for nursing students by the National League of Nursing Education. The Grading Committee believes this recommended amount of theory should constitute the absolute minimum offered by any school.

Only 22 per cent of the accredited schools studied by the Grading Committee comply with the present "very low requirements" for hours of theory. The typical school gives 124 less theory and 843 hours more practice than the League standards contemplate, the Committee finds.—*Western Hosp. Rev.* XXI, 5:13 (July), 1933.

Canadian Appointment of Nurse as Health Consultant—The Ontario Department of Health, through the recommendation of the Minister of Health, has made Miss Elizabeth Smellie Chief Superintendent of the Victorian Order of Nurses of Canada, Honorary Consultant in Public Health Nursing. This is an official government recognition of the value of nurses as health counsellors.—A Nurse as Health Consultant. *Canad. Nurse,* XXIX, 5: 234 (May), 1933.

This is right in line with the action of the New York State Department of Health, which recently appointed Katharine Tucker, R.N., Director of the National Organization for Public Health Nursing, as consultant in public health nursing.—Why Not Make Use of the N.O.P.H.N.? *A.J.P.H.* XXIII, 2:170 (Feb.), 1933.

A Visiting Nurse Association Serves Research—A principle found in the urine of pregnant women was being studied by the Biological Laboratories of E. R. Squibb & Sons, New Brunswick, N. J., in 1930. It was difficult to get an ample supply of such urine and the New Brunswick Visiting Nurse Association was consulted about ways and means. The director and her staff nurses picked out 6 prenatal patients who, they thought, would be glad to earn some money in this way and a routine was arranged with the Squibb Laboratories for 3 months.

When the trial period was over the Laboratories were sure their product was of value to the medical profession but they needed an increased supply of urine, collected between the 3rd and 8th months of pregnancy. More prenatals were put on the Squibb list, and each patient was turning in three 1-gallon jugs of urine a week to the Visiting Nurse Association Office where it was collected by Squibb. In the 2½ years this plan has been in operation, $8,000 has been distributed to 199 expectant mothers.

The Medical Advisory Committee of the V.N.A. was consulted from the beginning of the experiment. Each staff nurse "selected cases in her district, explained the purpose of the plan to the

* Please send printed matter or other material relating to public health nursing to Eva F. MacDougall, 6 State House Annex, Indianapolis, Ind.

patient, taught the patient the collection routine and checked up failures. The office staff supervised the exchange of bottles at the office and took care of the cash payment received from E. R. Squibb & Sons."

The financial need of the family was considered in choosing the patient. The nurses had to be sure the money received for the urine was well spent and had to plan with the patient, the physician and the relief agencies to this end.

Whenever the urine was not acceptable, whether for a pathological or a chemical reason, the visiting nurses were notified and they in turn notified the private physician, the clinic and the patient. The patients tried to follow accurately the nurses' instructions for payment ceased if the urine did not measure up to acceptable standards. In several specimens the chemical constituents were not right, apparently due to the faulty diet of the prospective mother. On this problem the staff nurses of the V.N.A. and the Home Economics Department of New Jersey College for Women in New Brunswick worked together to the benefit of all.

Private physicians, the city physician, the hospital, the emergency relief administration, the charity organization society and the Overseer of the Poor all met together to discuss this plan as it related to families on the relief rolls of the city.

Soon after the plan was under way Squibb requested the V.N.A. Medical Advisory Committee for advice as to how they could be assured that the women from whom collections of urine were made were free from syphilis. This committee and the physicians caring for maternity cases in the community consented to have a smear and a Wassermann taken on each patient in the Squibb Laboratory. A confidential report of the findings was sent to each patient's physician.

"All in all this unusual plan has been of great service to the patients, the research laboratory, the social agencies, the private doctors, the hospitals and the community in general."—Emma Rae McLeod, R.N. and Margaret B. Wright. A Community Serves Research, *Pub. Health Nurs.*, XXV, 8: 436–438 (Aug.), 1933.

For Superintendents and Supervisors Only—The nursing personnel of a well regulated hospital or public health nursing association, figuratively speaking, forms a pyramid. The nursing staff forms the base, the supervisors are above them, and at the top comes the superintendent of nurses. It is by virtue of superior training or superior experience or both that the supervisor should have authority over the staff nurse; mere authority unsupported by superior training or experience breeds nothing but contempt among the nurses who must submit to it.

Here are some of the qualities a nurse has a right to expect of her supervisors always and everywhere: fair play, professional honesty, an equable disposition and firmness of decision. Added to these qualities should be superior training and superior experience.

It is good policy and not below her dignity, for the supervisor to invite constructive criticism of her work from the nurse's point of view. Staff nurses are much more apt to act like human beings if they know they have a human being over them who dares to admit now and then that she is infallible.—The Nurse Looks at Her Supervisor, by Harlan C. Koch, Ph.D. *Trained Nurse & Hosp. Rev.* 90, 7:39–41 (July), 1933.

EDUCATION AND PUBLICITY*

Prenatal Letters Increasing in Demand—The use of the prenatal letter service offered by the Division of Maternity, Infancy & Child Hygiene was greater by more than 50 per cent in 1932 than in the year before, reports the New York State Department of Health, in *Health News* (Albany, N. Y.), May 22, 1933.

Distribution through nurses and clinics accounted for 83 per cent of the names on the mailing list.

The Parents' Book, carrying a coupon for the prenatal letter service, was sent automatically to each bride when her marriage was recorded. Almost every mail brought returned coupons, and those who received the letters frequently sent in the name of a friend.

The increased use of the service was due in large part to the continued support of nurses throughout the state working individually or in organizations such as visiting nursing associations, the American Red Cross, and insurance companies. During the past year, one large insurance company approved the prenatal letters for pregnant women insured by them and another continued to refer many expectant mothers under its care. Boards of health of several cities also made liberal use of the service.

"Better Health Verse at Hand"—Says *Ohio Health News,* Columbus, May 15, 1933:

Better health verse for children is coming to the front in some of the recent books. Only a few years ago virtually all material of this kind was inane, to use no harsher term; much of it was silly and a large proportion was badly written. Excerpts from three of the latest books, *Little Miss April,* by Anne Robinson; *Skipping Along Alone,* by Winifred Welles, and *The Bucking Burro,* by Nancy Ricket Ranson, have come lately to editorial attention, and all reflect a vast improvement over run-o'-mine stuff of hardly more than yesterday. Any mother who still finds opposition and resentment when she places the carrots and spinach on her little one's plate is likely to appreciate this bit of verse, taken from "Old Bossy," as found in *The Bucking Burro:*

I asked our cow, Old Bossy,
Who gives delicious milk,
"Why is your skin so glossy,
And soft as finest silk?"

She ate her beets and carrots—
"Why! don't you know?" she said,
"Green veg'tables and cereals
And early hours to bed!"

Little Miss April is from the Oglethorpe University Press, Miss Welles's book is a Macmillan publication, and *The Bucking Burro* is from the Kaleidograph Press.

"Healthland" at Farmers' Picnic—Healthland, an exhibit arranged by the County Department of Health, was one of the chief centers of attraction at the Farmers' Picnic in Cattaraugus County, June 24, 1933.

The clanging of the bell on the "Healthland Special" train attracted a throng of children and their parents. The eager children were weighed and measured and given their tickets by the nurse. After these preliminaries were attended to the jovial conductor assisted the children down the steps and into the spacious, brightly painted coaches. The engineer received his signal and with a toot of the whistle and the clang of the bell they were off for the Land of Health.

Upon their arrival at the Gate of Healthland the children had their tickets punched indicating the various stations at which they should stop while in Healthland. A nurse accompanied the children and emphasized the health rules which were suggested by the exhibits, or "stations," as follows:

* Please address questions, samples of printed matter, criticism of anything which appears herein, etc., to Evart G. Routzahn, 130 East 22d St., New York, N. Y.

"Playmeadows," "Drinkwater," "Sunshine Park," "Land of Pearls," "Bathtubville," "Milk Station," and "Sleep Mountain."

The show was held under the grandstand. A tractor and several trucks were the basis of the "train." Empty oil drums and wall board, with vivid paint completed the picture. The round trip ticket entitled the child to a train ride to the stations or the exhibits, and to a return ride to the starting point.

For a description of the ingenious exhibits and snapshots of the train write to Dr. J. Warren Bell, County Dept. of Health, Olean, N. Y.

A 2,000 Year Old Idea—The father's part in child welfare is receiving much attention among health workers in England and Ireland. *Mother and Child*, London (June, 1933), says:

> All those who are advocating the study of fathercraft as a factor in the child welfare movement may not be aware that as a matter of history the idea of fathercraft actually preceded that of mothercraft. Dr. Eric Pritchard, speaking at the third annual conference of Fathers' Councils at the Violet Melchett Infant Welfare Centre on March 23, 1933, pointed out that nearly 2,000 years ago Plato claimed that the bringing up and education of children was so important a matter to the State that this duty should be undertaken by its most intelligent members. These Plato considered to be men and fathers. Dr. Pritchard also pointed out that Dr. William Cadogan, a well known London physician in the year 1760, held the view that fathers ought to take a hand, owing to their superior intelligence, in the care of infants. He regarded this, the modern revival of an old belief, to be extremely valuable to the welfare movement.

"Interpreting Medicine to the Public"—This is the title of a clear and readable account of the work of the Medical Information Bureau of the New York Academy of Medicine, by Dr. Iago Galdston, its director.

> In its credo, the objectives of the Medical Information Bureau are defined as follows: "(1) to facilitate the dissemination of authentic information on medical and public health matters, (2) to stem and curtail quackery, and (3) to promote a better understanding between the public and organized medicine."
>
> If it were not for the bizarreness of the expression, the Information Bureau might well be called the intelligence service of the medical profession, comparing it in a sense with the intelligence service of the army. That this view of the Medical Information Bureau is not entirely fanciful is attested to by the fact that many medical associations throughout the country have shown a marked interest in the bureau and some have established similar organizations. More than that, in the City of New York, the legal profession has followed suit and has also created an Information Bureau.

Quart. Bull., Milbank Memorial Fund, 40 Wall St., New York. July, 1933. Copy *free*.

Wanted at Indianapolis—Most important to show at "Education and Publicity" headquarters is whatever new and good materials have been produced by our readers and other public health workers.

The headquarters display is made up of (1) portfolios of samples and information on method; (2) some portfolios of assembled subject matter samples; (3) portfolios sent by public health workers; (4) portfolios supplied by a few national health agencies, or concerns doing a certain amount of health work; (5) a few selected devices and materials.

Please write, as suggested elsewhere, about what you have.

Samples of materials which could be included in the first and second groups of portfolios noted above should be sent early to

Indianapolis Display
Evart G. Routzahn
130 East 22d St., New York

Whether or not you have already sent to the editor samples of printed or mimeographed material, please send copies now to the address above.

Subjects on which material is

especially desired: public health and health organizations in the depression; presenting health topics to groups at any time and anywhere by any method.

Write Before You Pack—Please write before you take or send an exhibit or display, even a chart or portfolio, for the Annual Meeting at Indianapolis, October, 1933. When two or three people turn up without making advance arrangements a lot of trouble results.

All display space at Indianapolis will be limited. Education & Publicity will have a plan for its limited space. *So please write about anything you will have to display.* Write about any class of Exhibits to American Public Health Association, 450–7th Ave., New York.

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in certain of the publications sold at 5 cents or 10 cents a copy. The health department or association might arrange for such sale through a coöperative book seller even though he sold them at cost.

Hygeia for August, 1933—"The Facts About Proprietary Foods" (the problems; what the American Medical Society has done; a proposed book on "Accepted Foods"—and the unaccepted); "Forty—Looking Forward" ("the beginning of a man's usefulness"); "Dog Laws" ("for those who love dogs but love their children more"); "In the Shadow of the Needle" (a diabetic patient); "The Cross-Eyed Child" ("early treatment will correct this handicap"); "Vitamin D Milk" (what it is, how prepared, proper way to use it); "Thinking of Studying Medicine" (what to expect); "Egg Free" (substitutes for eggs); "The Effect of Teeth on Facial Expression"; "Exhibits of the A.M.A." (pictures of modeled figures of medical leaders); "Preventive Psychiatry" ("facing the facts of realty squarely and frankly"); "Training for Athletics & Health" (correcting physical defects); "Safeguarding the Take-Off for School"; "Sex Education" (plant and animal reproduction); "Eating Under the Sky" (how the day may be "perfect"); "Progress in Preventive Medicine" (respiratory diseases); "School and Health" (includes "Teaching Health" and "New Health Books and Teachers' Materials."—American Medical Association, 535 N. Dearborn St., Chicago. *25 cents. Sample copy free.*

Suppose We Compare Notes—The unlovely effect of poison ivy on the editor of this department makes poison ivy information of special interest.

Material has been gathered from a group of state health and agriculture departments and other sources. "The facts about poison ivy," its prevention and first aid medicines vary quite a little. For example: "Some persons are so susceptible that they are affected even by passing near the plant" *versus* "Despite the mass of hearsay evidence, ivy poisoning is not borne by the air."

Do we thus disagree only about poison ivy, on which agreement should be more easily possible than on some other subject?

A Radio Contest—Prizes of $20.00, $10.00, and $5.00 are offered for the best radio sketch presenting the whole subject of public health nursing or any phase of it. The sketch may be in the form of a dialogue, a dramatic sketch, a playlet, a story, or a recitation of any kind; it may concern one patient or many, the preventive or curative side of the work, the state, county, or local program—*but it must tell something of importance about public health nursing in a way that will make people listen,* and be appropriate for the radio. It must not consume more than 12 minutes to present and therefore should not be longer than 1,500 words, shorter if possible. The contest is open to anyone. Individuals may send in as many entries as they wish. The three judges will represent the public health nursing field, the non-professional radio audience, and the radio broadcasting experts.

The contest closes midnight, October 15, 1933, and the winning sketch will be published in the December number of *Public Health Nursing.* It is hoped that it will also be possible to arrange for broadcasting the winning sketch—either locally or nationally as seems appropriate.

Manuscripts signed by a pen name should be sent to Contest Editor, *Public Health Nursing,* 450 Seventh Avenue, New York. They should be accompanied by a sealed envelope containing pen name and real name and address of the author.

REPORTING

"Statistical Summary for 1932," the April-June, 1933, issue of the *Bulletin* of the Detroit Department of Health is mimeographed "in the interest of economy." Twenty-three letter size pages, with cover.

"Twenty-five Years of Saving Sight" is the title of a report issued by the National Society for Prevention of Blindness, 450–7th Ave., New York. Striking gains during a quarter century are presented in attractive and quickly grasped picture diagrams, one of them on the cover. The brief illustrated review of 25 years occupies 3 pages preceding an 8 page annual report.

Hygeia for July, 1933—Some of the articles in *Hygeia,* 535 N. Dearborn St., Chicago, July, 1933:

"Sex Education (Ideals and Purposes)," "A Century of Progress" (A.M.A. exhibits), "Live Statistics," "Babes in the Woods" (vacation health problems), "Are Foods Truthfully Labeled?" "Safe Swims for Campers," "Training for Athletics and Health," "The Dangers of Spider Bites," "Eradication of Tuberculosis from Cattle," "Eye Hygiene—Eye Education," "Progress in Preventive Medicine," "Shoes Have Tongues," "Speaking of Hair," "School and Health" (a department).

DEPRESSION DISCUSSION

"An Illuminating Contrast" is a diagram and a page article emphasizing the per capita outlays in Kentucky for medicines *versus* public health. *Bulletin,* State Board of Health, Louisville, Ky. July, 1933.

"Essential Health Activities," a release from Iowa State Department of Health, quotes the AMERICAN PUBLIC HEALTH ASSOCIATION on the essential five types of activities, and then illustrates their significance in relation to the whole:

> The State Department of Health provides that due emphasis be given to each of the above mentioned activities. To illustrate how these five essential functions are inter-related, the interest of the various bureaus in the newborn baby, preschool and school child may be cited as an example. Child health is safeguarded by providing information and instruction for the mother which will enable her to give the child such care and training as will make possible his highest mental and physical development. Through the Bureau of Vital Statistics, complete and accurate birth registration is kept, as well as records indicating deaths which occur among children from such preventable diseases as diphtheria and tuberculosis. Contagion is prevented or controlled against further spread through the encouragement of immunization early in life, through the prompt reporting of infectious disease and through coöperation between the State Department of Health and health officers in local communities. Public health laboratories and sanitary engineers provide additional bulwarks of protection about child life, through the procuring and analysis of samples from public water and milk supplies and through various tests of specimens forwarded from those suspected of harboring disease germs. Through improvement of sanitation animal and insect-borne diseases are held in check.

SCHOOL—THE CHILD

"The Hunger Strikers," by Gertrude Thomas. *American Journal of Nursing,* 450–7th Ave., New York. Feb., 1933. Why some children don't eat certain foods and what might be done. *35 cents.*

"Alcohol," by J. F. Rogers, M.D. *School Life,* Washington, D. C., May, 1933. *5 cents.* "How changing liquor laws revive a teaching problem."

"Health-Service Activities," by W. A. Kincaid. *School Executives Magazine,* Lincoln, Neb. June, 1933. *35 cents.* Includes case stories of "Typical Cases of Neglect."

"When the Baby Cries," by W. A. O'Brien, Minn. State Medical Assn. *Everybody's Health,* 11 W. Summit Ave., St. Paul, Minn. July, 1933. *10 cents.* Radio talk.

MOTION PICTURES

The following new pictures are bulletined by the Department of Commerce, Washington, D. C.

"The House Fly": motion photomicrographs of structures of the house fly which help to make it a health menace. Dangerous habits, rapidity

of breeding and methods of controlling this filthy insect are shown. 15 minutes. Silent. 16 mm. Sold. Eastman Teaching Films, 343 State St., Rochester, N. Y.

"Good Hospital Care" dramatization of service in an approved hospital from the time the patient enters until she leaves. 22 minutes. Sound. 35 mm. *Free.* Distributed by American College of Surgeons, Chicago, and Petrolagar Laboratories.

"The Conquest of Diphtheria": story of diphtheria from the "onion poultice day" to the present positive methods. 15 minutes. Silent, 16 mm. and 35 mm. Metropolitan Life Insurance Co., 1 Madison Avenue, New York.

EDUCATIONAL MATERIAL

"Health Through the Ages," by C.-E. A. Winslow and Grace T. Hallock. Metropolitan Life Insurance Co., New York and Ottawa. *Free.* Selections from the table of contents will indicate the nature of this 64 page pamphlet; "Health in the Stone Age," "The Hebrew Health Code," "The Black Death," "The Lady with the Lamp," "The Secret of Contagion," "The Conquest of Yellow Fever." It has many audiences, and is a splendid contribution to spreading an appreciation of the scientific background of medicine and of public health.

The 1933 edition of "Books on Tuberculosis" lists all of the best English and American texts by subject, with an alphabetic author list. *Copy free, Journal of the Outdoor Life,* 450–7th Ave., New York, N. Y.

"Publications — Periodicals — Motion Pictures on Tuberculosis." 16 pages. *Free.* 1933 edition of catalogue of materials issued by National Tuberculosis Association, 450–7th Ave., New York, and available through state tuberculosis associations.

"Public Health Education: The Functions of the University and of the Private Foundation," by John Sundwall, M.D. Reprint from *Public Health Reports.* Supt. of Documents, Washington, D. C. *5 cents.*

"The Tuberculosis Problem in Missouri," by Dr. Scott P. Child. Reprint from *Journal* of Missouri State Medical Assn. Missouri Tuberculosis Assn., 2221 Locust St., St. Louis, Mo. 7 pages. *3 cents.* Includes need of education (of medical profession, medical student, general public).

Single copies of the following (enclose *3 cents* postage) will be supplied by Dr. J. W. Wisan, Council on Mouth Hygiene, N. J. State Dental Society, 1143 E. Jersey St., Elizabeth, N. J.:

"Give Him Good Health," an especially good 6-page *illustrated* folder "approved for distribution in public schools" in New Jersey.

"Who Should Present Dental Health Information to the Pupils?" by A. G. Ireland, M.D. Reprint from *Dental Cosmos.* May, 1933. Calls for team work.

"Mouth Health of School Children," by Pauline B. Williamson. Winning the coöperation of the children.

The National Society for the Prevention of Blindness, 450–7th Ave., New York, N. Y., offers the following reprints and original publications:

"Diet and Eye Health," by Walter F. King, Buffalo. 8 pages. *5 cents.*

"Vision and Other Tests for Automobile Drivers," by Maxwell Halsey. 14 pages. *15 cents.* Valuable study of drivers' examinations.

"What To Do for Cross-Eyes," by Dr. Walter Baer Weidler, New York. 2 pages. *5 cents.* For nurses, social workers, parent-teacher associations.

IT MAY BE HERE

Circular letters are being mailed at irregular intervals to local milk producers and dealers by the Attleboro, Mass., Health Department. They are

friendly, straightforward explanations of new regulations and reminders of old ones. Copies supplied upon request.

"A Cough in the Night" is the title of a news release on whooping cough issued by Iowa State Department of Health.

A directory of "Whole-Time County Health Officers, 1933" appears in *Public Health Reports*, Washington, D. C., July 14, 1933. *5 cents.*

"Informing the Public and Money Raising," by Alma C. Haupt. *Public Health Nursing*, 450–7th Ave., New York. *35 cents.* "A resumé of recent methods in 65 public health nursing associations," with illustrations of a circular card telephone number record, and of a beaver board poster with bristol board cut-outs. Aug., 1933.

The June 28, 1933, "Letter to Periodical Publishers," National Better Business Bureau, Chrysler Bldg., New York, gives reports from Federal Trade Commission on Trigestia Tablets, obesity remedies, etc. Copies free to health agencies.

"A Memento of Public Health Work in the Eighties" reproduces what is probably the first official badge worn by a member of the State Health Department of New York. In *Health News*. July 17, 1933. A reminder of the news value of old publications, records and miscellaneous matters.

"The Public Health Nurse," by Dr. J. D. Dowling, Health Officer, Birmingham, Ala. In *Public Health Nursing*. Aug., 1933. Radio talk.

Public Safety, National Safety Council, 20 N. Wacker Drive, Chicago, for Feb., 1933, is interesting for its cover made up of newspaper clippings on a blue background; several picture diagrams; and its review of "Oddest Accidents of 1932" (quite readable, with quotable warning examples). *10 cents.*

The 17th National Baby Week was held in England, July 1–7, 1933.

"'She's Had the Doctor!'" by W. E. Chase. *Atlantic Monthly*, Boston. June, 1933. *40 cents.* Drama of the doctor's visit; low cost of medical care in early New England days; home remedies and superstitions.

"Speech Material," by Lena D. Dietz. *Trained Nurse*, 468–4th Ave., New York. July, 1933. *35 cents.* Talk suggestions; brief outlines for a variety of talks.

"A Study of Mortality by Specific Causes of Death in Thirteen Large American Cities," by W. S. Groom. Public Health Federation, Cincinnati. "Introduction" and "Section 1—Scarlet Fever." *10 pages.* First of a series. *10 cents.* Comparative usable data.

Time is passing for the enrollment of your city in the Inter-Chamber Health Conservation Contest. Address the AMERICAN PUBLIC HEALTH ASSOCIATION.

HONORABLE MENTION

To National Health Library of National Health Council, 450–7th Ave., New York: for including the publication city with all periodical references in weekly issues of *Library Index*.

A Diphtheria Display Idea—V. T. Schuhardt, A.M., and S. M. Bohls, M.D., of the State Hygienic Laboratories, Austin, Tex., have developed a placard display against diphtheria. It is an adaptation of the Hamilton, Ontario, display illustrated in the *Journal*, August, 1932.

Statistics as to cases and deaths before and after introduction of immunization, is emphasized at the base by rows of crosses representing deaths in selected years.

Supplementary to the Hamilton comparison are two outline maps of Texas, one crowded with crosses for 1931, the other questioning the number to be expected in 1941.

Address the authors for the loan of a photograph.

BOOKS AND REPORTS

Medical Biology. A Laboratory Manual of Bacteriology, Mycology, Immunology and Parasitology; Consisting of Experimental Guide, Interpretive Text, Atlas and Protocol Form—*By William Barnard Sharp, M.D. Galveston: Medical College Edition,* 1933. 443 pp. Price, $4.50.

This book has apparently been the product of courses as given by the author under rather peculiar local circumstances in the school from which the publication comes. It is doubted that it would find adaptation in similar departments of other schools.

There are some commendable features, especially in the diagnostic and clinical discussions, which are of practical value. There are some mistakes in spelling, as "hemaphroditic." In the paragraph, "Fertilization with Night-soil" occurs the ambiguous statement, "That with animal manure does no harm, because germs of intestinal infection in man do not affect the domestic animal . . ."

In some respects, the material is quite elementary for students in a school of medicine. It is not strictly a text for use in bacteriology, for it contains considerable non-bacterial matter. As a laboratory book or guide, or as a notebook for recording observations and conclusions, it is too voluminous in didactic material. In many instances where details should be given, they are deficient or absent. Under the description of blood cultures, no detail of the procedure is given for culturing quantities of blood in fluid medium, which is the only one of practical value. The plate method of blood culture, which is given in detail, is often not satisfactory in clinical medicine. The same may be said of the plate culture of urine in typhoid fever.

Droplet infections, diphtheria of wounds, and a number of similar common conditions are not mentioned. Under "Milk Borne Disease," undulant fever receives no mention.

The statements in the chapter, "The Tubercle Bacillus" that the bovine variety infects infants and young children about as often as the human, and that aside from the occasional alimentary or meningeal infection, the bovine type is relatively mild and usually of lymph glands only, are not in conformity with the impression held by most authorities.

The author has made a commendable effort in illustrations of his personal production, but unfortunately many of these fail to illustrate. The absence of a scale for illustrations is always a fault. Numbers of the illustrations are ill-chosen, too small, reveal a lack of contrast, and fail to reveal the object to be shown. The wide use of photomicrographs to show morphology of bacteria, such as the types of staphylococci or the Gram negative bacilli, is unfortunate when there are in reality no morphologic differences in these groups possible of being shown in the illustration. M. PINSON NEAL

Reports, National Quarantine Service, Series III—1932—*Edited by Wu Lien-Teh and Wu Chang-Yao.*

The Chinese National Quarantine Service has issued recently the third in a series of annual reports inaugurated in 1930, which shows in a very interesting manner the work accomplished and the progress made by this comparatively new organization during the past year in spite of almost insurmountable ob-

stacles resulting from military operations involving a considerable part of the country. Consistent improvement is manifested each consecutive year in the three annual reports issued to date. The English text of the third report is most excellently written and contains very interesting data, intelligently and entertainingly presented.

The preliminary results of rat and rat-flea surveys of several principal ports are published in this volume. For the first time in the history of the country, a systematic rat-flea survey of the principal ports of China was undertaken, with the intention of continuing the work until accurate data have been assembled concerning the species of rats and rat fleas found in the various ports.

Research into many other problems of port health is being conducted, and the report shows that routine work of inspection and fumigation is being placed on a more methodical basis in the nine ports in which the Service is now operating. The port health services of Tientsin, Taku-Tangku, and Chinwangtao were formally taken over by the National Quarantine Service on April 6, 1932, making a total of nine ports now under the control of the Service.

The report presents a brief history of the Manchurian Plague Prevention Service, which has enjoyed an international reputation in scientific circles through the work of its modern research institute and unique plague museum, but which now practically exists in name only as a result of the military occupation of the North-Eastern Provinces which culminated in the seizure of all the public services hitherto functioning there under the Central Government. The headquarters of that Service, however, have been transferred from Harbin to Shanghai, where an effort is being made to continue the work under the new conditions.

The results of a survey made of plague in wild rodents and of a new survey of pneumonic plague, which would ordinarily have been published in the reports of the Manchurian Plague Prevention Service, are presented through the medium of the *Annual Report of the Chinese National Quarantine Service*. The new evidence collected in these surveys tends to show more clearly than ever the great extent to which wild rodents are involved in the perpetuation and spread of plague. The report expresses the hope that the new anti-plague serum which has given such promising results in the treatment of bubonic plague in India will also prove to be useful at least in the prevention, if not the treatment, of the pneumonic type.

During the past year, the resources of the Chinese National Quarantine Service were taxed to the utmost by the devastating cholera epidemic which invaded 23 provinces and 312 large cities of China, with a death toll of nearly 34,000, and by the outbreak of smallpox which occurred in Amoy. Detailed accounts of both epidemics are given. Encouragement is found in the fact that the intensive anti-cholera measures which were taken in Shanghai resulted in that city having the lowest mortality rate of any of the large cities involved, though it had the largest number of cases.

Interesting chapters are included on "Some Aspects of Modern Quarantine," "Port Health Work in Singapore," and "Refugee Relief and War Casualty Work in Shanghai." The volume is brought to a conclusion by the incorporation of detailed reports of the Boarding, Fumigation, and Medical Services Divisions, and of several of the port quarantine stations at present under the supervision of the national quarantine service. Instructive data are furnished in the form of tables, charts, and maps, and a large

number of illustrations add to the interest in the publication. A note of optimism runs through the entire report, and the reader is left with the impression that no opportunity will be lost by the Service to attain high efficiency. F. A. CARMELIA

The Approach to the Parent: A Study in Social Treatment—*By Esther Heath. New York: Oxford University Press,* 1933. 163 pp. Price, $1.25.

In dealing with personality deviations and behavior disorders in children, the one outstanding finding is a faulty relationship between one or both parents and the child. The therapy therefore consists, to a large degree, in treating the parents. This is well exemplified in the handling of the four boys whose problems are set forth in this book. It clearly shows that successful results are obtainable if a worker is capable of evaluating the material and proceeding accordingly.

By contrasting the social technic of 8 years ago with that employed at the present time one readily sees the strides that have been made in social case work.

The author stresses the all important therapeutic fact of the relationship between worker and client, and one closes the book more firmly convinced that the situation between the person who gives help and the one who seeks it is a recapitulation of life's patterns, and the outcome of this relationship is, to a large extent, a determiner of future relationships of the patient, whether he be an adult or child.

The cases presented are somewhat typical of the intake of a Child Guidance Clinic and if carefully read the contents of the book show the methods and time necessary for good results.

The advantage of including the Summary of Clinic Findings and Recommendations in the appendix is questionable because the reader's task is less easy. However, such an arrangement prevents the presentation from resembling the usual topical case history as the material is presented chronologically. This arrangement also affords the author the opportunity of giving the facts in a less stereotyped manner and wording.

To those who are interested in social therapy of problem children, to the sceptics who doubt that a social worker can do anything, and to the uninformed who wonder how applied psychiatric social work can transform a "bad boy into a good one," the book will be of value. ELIZABETH I. ADAMSON

Nervous and Mental Diseases for Nurses *(2d ed.)*—*By Irving J. Sands. Philadelphia: Saunders,* 1933. 281 pp. Price, $1.75.

This book starts out in the old stilted way to give a long description of Elementary Neuro-Anatomy, on which it is very difficult to concentrate. Speed the day when people who write textbooks will start with the specific and then go on to the general!

The best and clearest chapters are "The Glands of Internal Secretion" and "Psychoanalysis for Nurses." The author commendably puts a great deal of emphasis on the prevention of nervous and mental diseases, and his chapter on Mental Hygiene shows he is thoroughly up-to-date on this.

A more readable and a more effective book on this subject would give the nurses more of the philosophy of dealing with patients suffering from nervous and mental diseases. They need a little inspiration.

Many pages are hard to read because the text lacks sufficient subheads and italics. Moreover, in these days when many nursing schools are giving their freshmen courses in English it seems a shame that any textbook they read has not paid careful attention to correct English. EVA F. MACDOUGALL

Stop That Smoke!—*By Henry Obermeyer. New York: Harper & Brothers,* 1933. 289 pp. Price, $2.50.

Mr. Obermeyer has accumulated an amazingly large amount of information and has set it forth in interesting and carefully arranged order. He is trained in journalism and is assistant to the Vice-President of the Consolidated Gas Company of New York.

The connection between smoke and disease as given is, in part, as follows:

> Any agency that is capable of crumbling a skyscraper and withering a tree may be said to admit of some harm, at least, to the human anatomy. Almost every type of respiratory disease is aided and abetted by the presence of smoke. When the delicate membranes of the eyes, nose, throat and lungs are cut by sharp particles of unburned cinder and irritated by noxious gases, while the breathing-space of the lungs is clogged and blackened with soot, it may be imagined that these organs readily become favorable soil for bacterial and other infections. . . . Today there is almost a direct ratio between the incidence of smoke and pneumonia. A similar relation is seen in the prevalence of rickets. . . .

There are chapters on the harm done to property and health by smoke; the legal, administrative and economic aspects of smoke abatement; and the practical measures which should be taken to secure the proper consumption of fuel.

One of the most helpful parts of the book is the one which deals with the means of carrying on the war against smoke, as illustrated by the experience of many cities, including Chicago, Cincinnati, Pittsburgh, Rochester, Buffalo, Boston, Nashville, Atlanta, and Indianapolis.

The "most promising development of recent date" is considered to be the organization of a Pure Air Committee under the auspices of the American Association of Mechanical Engineers to direct and coördinate present and future problems relating to air contamination, develop model smoke laws, and serve as a clearing house for research.

There are 8 pages devoted to a bibliography of smoke fighting, and an unusually full index.

GEORGE A. SOPER

Broadcasting Health—*By J. Mace Andress, Ph.D., and I. H. Goldberger, M.D. Boston: Ginn,* 1933. 401 pp. Price, $.80.

In few fields are recent changes more evident than in school texts for teaching hygiene. The old books on physiology with their anatomical data and lurid descriptions of the interior of a drunkard's stomach have given way to attractive texts, more accurate and far more likely to appeal to the pupil.

The book under review takes advantage of the modern child's familiarity with and interest in radio to throw a glamor about facts of everyday hygiene. Furthermore it is possible for the teacher to turn the printed story into actual reality in the schoolroom by encouraging the pupils themselves to put on a similar broadcast.

The scope of the book is "the whole subject of foods in relation to health and civilization." It is planned for older children below high school age. Controversial subjects like alcohol and tobacco are handled discreetly enough to pass muster with the W.C.T.U. on the one hand and the medical society on the other. The authors do not hesitate to recommend pasteurized milk—though, perhaps, more explanation might have been given as to the reason for pasteurization.

As for the English—well, let us hope that sometime the school child will be as careful of his speech as were the children of the Work Together Room of the Abraham Lincoln School. At least the text sets a good example.

MERRILL CHAMPION

Obstetrics for Nurses—*By Joseph B. DeLee. (10th ed.) Philadelphia: Saunders,* 1933. 666 pp. Price, $2.75.

The first edition of this book came out in 1904. All these years this text has been widely used in nursing schools all over the country. The other editions taught predominantly obstetrics as practised in the hospital; this 10th edition puts the paramount emphasis on obstetrics in the home, for, as the author says in the preface, " 2,100,000 babies are born in the United States every year, and 1,500,000 are born in their own homes."

Extra emphasis is put on diet in pregnancy, on the mental hygiene of the gravida and on the ways of preventing puerperal infection, the toxemias and complicated labor. The author sees clearly the public health aspect of the whole field of obstetrics, and, what is more, knows and understands nurses and gets their point of view. He knows they need encouragement and a little philosophy sometimes.

Public health nurses will like the book because of the appreciation it displays of the visiting nurse's rôle in the progress toward better obstetrics.

The book can be recommended unequivocally to all nurses.

EVA F. MACDOUGALL

A SELECTED PUBLIC HEALTH BIBLIOGRAPHY WITH ANNOTATIONS

Health Hazards of Sandblast Dust—Protective outfits for sandblasters were found to vary greatly. Helmets with a positive air supply of six feet of air per minute protect the worker adequately. Properly designed equipment can prevent dangerous dustiness.

BLOOMFIELD, J. J., and GREENBURG, L. J. *Indust. Hyg.* 15, 4:184 (July), 1933.

Recurrence of Milk-Borne Tragedies—The usual varieties of milk-borne communicable disease epidemics are spread before us. Cheese furnished a particularly virulent typhoid fever epidemic, so that, though the number of cases of communicable disease produced in 1932 was less than the previous year, the number of deaths was greater. This annual statement is a valuable reminder.

CRUMBINE, S. J. Epidemics from Infected Milk, Ice Cream and Cheese in 1932. Child H. Bull. 9, 4:124 (July), 1933.

How Shall We Measure Antirachitics?—Irradiated milk seems to be the most desirable antirachitic agent for large scale prevention, conclude these authors who compared it with milk from yeast-fed cows, cod liver oil, and viosterol. They found such discrepancies between clinical units (as measured in results) and rat units that the latter may well be considered misleading.

HESS, A. F., and LEWIS, J. M. An Appraisal of Antirachitics in Terms of Rat and Clinical Units. J.A.M.A. 101, 3:181 (July 15), 1933.

Stuffiness and Heat Sources—Another study of the effect of dull heat upon mucous membranes. Adequate ventilation or radiant heaters will prevent the " stuffiness " caused by excessive heating with dark sources of heat.

HILL, L. Infra-Red Rays, Comfort and Health. Brit. M. J. 3781:1096 (June 24), 1933.

Favorable Experience With Whooping Cough Vaccine—Pertussis vaccine administered before an epidemic reduced the mortality from

whooping cough to one-sixteenth of the rate among the control group in this experience in the Faroe Islands.

MADSEN, T. Vaccination Against Whooping Cough. J.A.M.A. 101, 3:187 (July 15), 1933.

Yardsticks for Health Projects—Dare we measure the effects of our pet programs in public health, if they can be measured? This writer has the temerity to conclude: "The national bill for public health education is a sizeable one. Of course, we think it ought to be larger. Would it not be economical in this time of depression to find out whether we are actually accomplishing by our efforts what we think we are accomplishing?"

PALMER, G. T. Measurement in Public Health. Child H. Bull. 9, 4:117 (July), 1933.

Why B. Tuberculosis Remains in the British Milk Supply—Difficulties encountered in ridding Great Britain's milk supply of tuberculosis are enlarged upon in the contrast of ideas of a health officer and a veterinarian. Both cast envious eyes toward the results achieved on this side of the water, where they claim the problem is so much simpler.

SAVAGE, W. G., Vs. GOLLEDGE, S. V. The Prevention of Human Tuberculosis of Bovine Origin. J. Roy. San. Inst. 54, 1:11 (July), 1933.

British Influenza Research—Throat washings from influenza patients instilled in the noses of ferrets produced a disease transmissible serially. Throat washings from convalescents or patients with ordinary colds produced nothing. Human convalescent sera neutralized the virus.

SMITH, W., *et al.* A Virus Obtained From Influenza Patients. Lancet 225, 5732:66 (July 8), 1933.

Immunizing Against Diphtheria With One Shot—One intramuscular injection of a concentrated diphtheria toxoid in woolfat immunized 99 per cent of 103 patients within two months. The practical advantages of this method are obvious, if it proves its value in wider experience.

STRAUS, H. W. Active Immunization Against Diphtheria. J.A.M.A. 101, 3:19 (July 15), 1933.

BOOKS RECEIVED

BIOLOGY OF THE PROTOZOA. 2d ed. By Gary N. Calkins. Philadelphia: Lee & Febiger, 1933. 607 pp. Price, $7.50.

FOOD AND DIETETICS. 7th ed. By Robert Hutchison and V. H. Mottram. Baltimore: Wood, 1933. 630 pp. Price, $7.25.

MILK. THE INDISPENSABLE FOOD. By James A. Tobey. Milwaukee: Olsen, 1933. 200 pp. Price, $2.25.

FRONTIERS OF MEDICINE. By Morris Fishbein. Baltimore: Williams & Wilkins, 1933. 207 pp. Price, $1.00.

NUTRITION. By Graham Lusk. New York: Hoeber, 1933. 142 pp. Price, $1.50.

KEEPING THE POOL SAFE AND SANITARY. New York: Mathiesen Alkali Works, 1933. Free.

DICTIONARY FOR NURSES. 2d ed. Compiled by Lois Oakes. Philadelphia: Reilly, 1933. 351 pp. Price, $1.00.

PROCEEDINGS OF THE FIRST INTERNATIONAL CONGRESS ON MENTAL HYGIENE. Held at Washington, D. C., May 5th to 10th, 1930. Edited by Frankwood E. Williams. New York: International Committee for Mental Hygiene, 1932. Two volumes.

THE ROAD TO HEALTH. By Herman N. Bundesen and Corinne Manry. Chicago: Laidlaw, 1932. Book I, 96 pp. Price, $.52. Book II, 125 pp. Price, $.56.

WHAT SHALL I EAT? By Edith M. Barber. New York: Macmillan, 1933. 106 pp. Price, $1.75.

NEWS FROM THE FIELD

Association Women in Public Health

ADA E. SCHWEITZER, M.D., *President*

International Congress of Women, Chicago, July 16–22, 1933—The Association of Women in Public Health, a member of the National Council of Women, was represented at the International Congress of Women by the President, Dr. Ada E. Schweitzer, and by Dr. Mary R. Lakeman, Chairman of the exhibit committee.

The Healthknowmeter exhibit displayed there was designed by Dr. Lakeman to make easily available to the public, details of information on public health subjects. On the wall over the exhibit table hung a large poster with numbered questions concerning health, such questions as are frequently asked of public health officials. A file box on the table contained cards answering the questions. The index cards bore numbers corresponding to the numbers on the poster. The following outline indicates the subjects included in the Healthknowmeter box: (1) Child Health, (2) Adult Health, (3) Health Education, (4) Parent Education, (5) Community Organization, (6) Hospital Service, (7) Laboratory Service, (8) Preventive Medicine, (9) Nutrition, (10) Social Service, (11) Public Health Nursing, (12) Mental Hygiene, (13) Opium, (14) Cancer, (15) Courses of Study.

Many persons visiting the exhibit were impressed with its possibilities of usefulness as an aid to students and to others wishing information. Outlines are being sent on request to all who left names and addresses. The Healthknowmeter will be displayed at the Indianapolis meeting of the American Public Health Association in October.

Adenoids among School Children of Naples

As a part of a general campaign against adenoids in Italy, according to a recent report, 77,000 elementary school children were examined in Naples, and 12,000—about 15 per cent—were found to have enlarged or diseased adenoids. Of the children with this defect almost one-half had to repeat the work of their school grades, and the quality of the work done by the children with the more severe cases was particularly bad. As a result of treatment, which was provided in most cases free of charge at public clinics, the number of "repeaters" has been reduced by almost half, with a considerable saving in the school budget; a great improvement has also been found in the children's physical development, their general well-being, and their resistance to disease.—*Difesa Sociale,* Rome, Feb., 1933.

Spanish Child Health Centers

As a means of combating the high rate of infant mortality the Government of Spain issued an order on March 30, 1933, for the establishment of a child health center in the capital of each province. These centers are to serve not only the cities in which they will be situated, but also the surrounding territory. Expectant mothers will be given advice with regard to prenatal care, and those without means will be provided with attendants at childbirth, in an effort to prevent puerperal infection. The infant health